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Angling

To the Right Worſhipfull Sr John Bellew of Bellews=
Town in the County of Meath in Ireland Kt whoſe family
for many deſcents have been Knighted for their ſervice to ye
Crown. This Plate is humbly dedicated by Richard Blome

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FISHING

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HORACE G. HUTCHINSON

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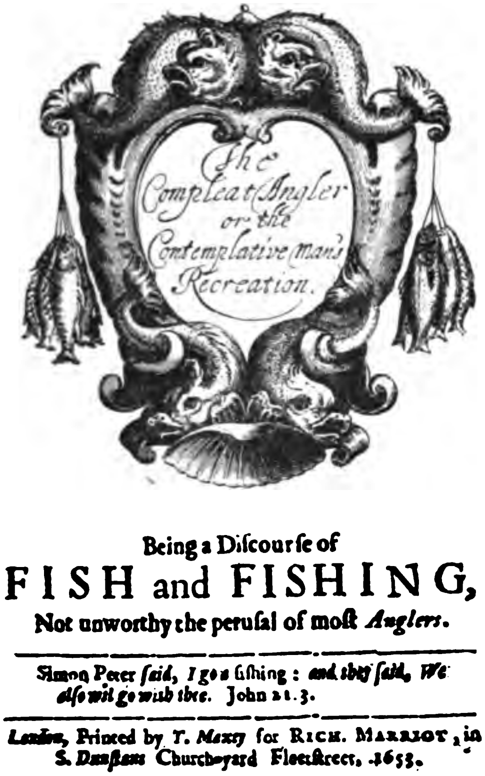
INTRODUCTION

Fishing is very far indeed from what it was in the days of the great and good Dr. Johnson—an affair of "a worm at one end and a fool at the other." At the latter end, instead of the simple wriggling worm, there is now a fly that is a precise imitation of some one or other of the insect forms upon the water—the dun or the spinner. The fisher of the most nice and delicate kind, that is to say, the fisher of the dry fly, has to be more than an angler—he has to be an entomologist; he has to know all the phases of the life of the aquatic food of the fish, and he has to offer his imitations of these phases in the precise manner in which, when living, they appear to the trout in the stream. Very largely indeed it is the valued contributor to these volumes, Mr. Halford, who has led to this increase of intelligence on the part of the man whom Dr. Johnson spoke of with such characteristic disrespect.

And while the angler has thus allowed himself perforce to become educated in the kinds and the metamorphoses of insect life in the waters, it seems that therewith he has acquired a noble desire for more exact and scientific lights than he ever used to possess, or ever wished to possess, about the nature of the creatures that are to be deluded to his angle. The angler has come to desire to be something of an ichthyologist. He is succeeding, with difficulty, by the aid of encyclopædias and the like, but he has not very ready to his hand any convenient means of scientifically studying the fishes that he catches. There is, to be sure, Couch's fine work, Gunther's, and others, but these are bigger than the average angler wants. He wants to know what the man of science has to say about the fish that are the objects of his sport; he wants to know where these fish in which he has a personal interest come in the general scheme of ichthyology as formulated by the man of science; but, apart from that, the fish in general do not claim his interest. So in these volumes I think I have been more than fortunate in the assistance of Mr. Boulenger to place easily and with authority before the reader the scientific facts about the fishes for which Britons angle. The main purpose of the book is to teach the angler to be less entirely what Dr. Johnson describes him, in regard to the actual angling—that is the main purpose, and needs no elaboration here; but besides that, the purpose is to let the angler learn, without tears, all that his newly awakened scientific interest in the classification and the life-history of the fishes demands for its satisfaction. Then when there arises, in due process of time, a new lexicographer, of Dr. Johnson's greatness, he will indite a very different definition of the human end of the angling engine.



The
Compleat Angler
or the
Contemplative Man's
Recreation.

Being a Diſcourſe of
FISH and FISHING,
Not unworthy the peruſal of moſt *Anglers.*

Simon Peter *ſaid, I go a* fiſhing: *and they ſaid, We alſo wil go with thee.* John 21.3.

London, Printed by *T. Maxey* for RICH. MARRIOT, in
S. *Dunſtans* Churchyard Fleetſtreet, 1653.

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PART I

SALMON

CHAPTER I

THE SALMON FAMILY (SALMONIDÆ)

Classification and Distribution

By G. A. Boulenger, F.R.S., V.P.Z.S., &c.

The Salmonids belong to a large group, or sub-order, of the bony fishes, which is characterised by having the swim-bladder in communication with the digestive tract by a duct, the posterior paired fins, or ventral fins, whenever present, inserted at a distance behind the shoulder girdle, with which they are in no way connected, a bony bridge (the so-called mesocoracoid arch) on the inner side of the shoulder-girdle, near the base of the pectoral fin, and, as the name of the sub-order (*Malacopterygii*) implies, the fins entirely formed of articulated, soft rays, without any pungent spines. They may be defined as normally shaped Malacopterygian fishes with the margin of the upper jaw formed by two bones on each side—the præmaxillary in front and the maxillary behind—with the oviducts incomplete or absent, the ova falling into the cavity of the abdomen before exclusion, with the rayed dorsal fin placed near the middle of the length of the body, and with a small, fleshy, rayless fin, the so-called adipose fin, on the upper side of the tail, in front of the caudal peduncle. The latter character is a conspicuous distinguishing mark by which a Salmonid can be recognised among all northern European fishes, and particularly the numerous members of the allied herring family, some of which are not without external resemblance to the white-fish and the smelts. The imperfect condition of the oviducts, quite exceptional among fishes, owing to which the large ripe eggs may be easily squeezed out of the abdomen, is a feature of great practical importance, since it renders artificial impregnation particularly easy, and to it is due the fact that the species of *Salmo* have always occupied the first place in the annals of fish-culture. Fertilised eggs of our northern species are transported in ice, the development being simply suspended for several weeks, and have thus been introduced by human agency into the southern hemisphere, where trout have now thoroughly established themselves in suitable waters, as in New Zealand and Tasmania.

Salmonids inhabit mostly the temperate and arctic zones of the northern hemisphere, and this is the case with all fresh-water forms, with one exception, *Retropinna*, from the coasts and rivers of New Zealand. A few deep-sea forms (*Argentina*, *Microstoma*, *Nansenia*, *Bathylagus*) are known from the Arctic Ocean, the North Atlantic Ocean, the Mediterranean, and the Antarctic Ocean, down to 2000 fathoms. The question has been discussed whether the Salmonids, so many of which live in the sea, but resort to rivers for breeding purposes, were originally marine or fresh-water. The balance of opinion is in favour of the former hypothesis, which is supported by the fact that the overwhelming majority of the members of the sub-order of which the Salmonids form part, inhabit permanently the sea, the Clupeids, or herring tribe, which are their nearest allies, being certainly of marine origin, as proved by their abundance in cretaceous seas, yet a few, like the shads, ascending rivers to spawn without this ever having been adduced as evidence in favour of a fresh-water origin of the family to which they belong. Paleontology, unfortunately, cannot in this case be appealed to, no remains older than Miocene (*Osmerus*, *Prothymallus*, *Thaumaturus*) being certainly Salmonids, the various cretaceous forms originally referred to them, such as *Osmeroides* of Agassiz and *Pachyrhizodus* of Dixon, being now placed with the Elopidæ, the family of which the tarpon and the ten-pounder are the familiar living representatives.

The beauty, gameness, and great economical value of the Salmonids have caused more attention to be bestowed on them than probably upon any other group of fishes. As Professor Smit tells us, a Swedish proverb says: "A dear child has many names," and this applies well to our salmon and trout, the species of which have been unduly multiplied by some writers. In my opinion, only about eighty species can at present be regarded as valid. These may be arranged in about seventeen genera, the affinities of which are best expressed by the following grouping:—

A. Swim-bladder present.

a. Branchiostegal rays (supporting the gill-membrane on each side), 8 to 20; ventral fin-rays, 9 to 13; stomach siphonal; pyloric appendages (to the stomach), more or less numerous (17 to 200). Breed in fresh water. *Salmo*, *Brachymystax*, *Stenodus*, *Coregonus*, *Phylogephyra*, *Thymallus.*

b. Branchiostegal rays, 6; ventral fin-rays, 11 to 14; stomach cæcal, with pyloric appendages in small numbers, 12 to 20. *Argentina.*

c. Branchiostegal rays, 6 to 10; ventral fin-rays, 6 to 8; stomach cæcal, with pyloric appendages few (2 to 11) or rather numerous. *Osmerus*, *Thaleichthys*, *Mallotus*, *Plecoglossus*, *Hypomesus*.

d. Branchiostegal rays, 3 or 4; ventral fin-rays, 8 to 10; stomach cæcal, without pyloric appendages. Deep sea. *Microstoma*, *Nansenia*, *Bathylagus*.

B. Swim-bladder absent; branchiostegal rays, 3 to 6; ventral fin-rays, 6 or 7; stomach siphonal, without pyloric appendages. *Retropinna*, *Salanx*.

Readers interested in the systematic relationships of the various components of this family are referred to the following important works, which also contain copious details on the life-histories and geographical distribution :—

GÜNTHER, A., Catalogue of the Fishes in the British Museum. Vol. vi. London, 1866. 8vo.

DAY, F., British and Irish Salmonidæ. London, 1887. 8vo, with plates.

FATIO, V., Faune des Vertébrés de la Suisse. Vol. v. Geneva, 1890. 8vo, with plates.

SMITT, F. A., History of Scandinavian Fishes. Vol. ii. Stockholm and London, 1895. 4to, with plates.

JORDAN, D. S., and EVERMANN, B. W., The Fishes of North and Middle America. Vol. i. Washington, 1896. 8vo, with plates. Also American Food and Game Fishes. London and New York, 1902. 8vo, with plates.

The genus *Salmo*, the most important from the economical and sporting points of view, is characterised by small smooth scales, which at certain seasons may become embedded in the slimy skin, a moderately high dorsal fin, and a large mouth provided with strong teeth, which are present not only in the jaws and on the palate, but also on the tongue; the maxillary or posterior bone of the upper jaw extends to below or beyond the eye. Young specimens are marked with dark vertical bars on the sides (parr-marks), which in some trout are retained throughout life, and have the caudal fin more or less deeply forked or emarginate, the form of the fin changing with the age and sexual development of the fish. Adult males have the jaws more produced in front than females, and both snout and chin may become curved and hooked. As pointed out by Dr. Günther, who was the first to make a profound study of the members of this genus, and especially of the British forms, there is probably no other group of fishes which offers so many difficulties to the ichthyologist with regard to the distinction of the species as well as to certain points in their life-history, the almost infinite variations which they undergo being dependent on age, sex, and sexual development, food, and the properties of the water. The difficulties in their study have rather been increased by the excessive multiplication of so-called specific forms, on the definition of which so much labour has been bestowed; but, with the exception of American writers, the tendency of late has been to take a broader view of the subject, and to reduce many of the supposed species to the rank of races, local forms, or varieties. Opinions also vary as to the importance to be attached to the characters which serve to group the principal species into natural divisions. Whilst Dr. Günther admitted two genera, *Salmo* and *Oncorhynchus*, Messrs. Jordan and Evermann go so far as to recognise five, *Oncorhynchus*, *Salmo*, *Hucho*, *Cristivomer*, and *Salvelinus*. The latter arrangement is certainly the more logical, the difference between the first genus and the second being of rather less importance than that between the second and third. However, considering the slightness of the distinctive marks on which these divisions are based and the complete passage which obtains between them, I think it best to maintain the genus *Salmo* in the wide and conservative sense, whilst retaining the divisions as subordinate groups or subgenera, with the following definitions :—

A. Vomer (the anterior median bone of the palate, between the paired palatines) flat, toothed along the shaft, at least in the young.

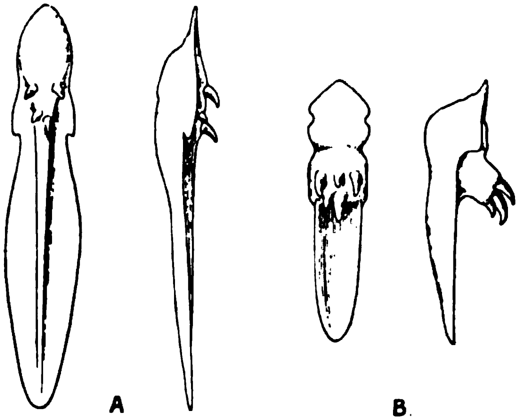
Anal fin with 12 to 17 well-developed rays.—*Oncorhynchus*, Pacific salmon.

Anal fin with 8 to 12 well-developed rays.—*Salmo*, true salmon and trout.

B. Vomer boat-shaped, the shaft strongly depressed behind the head, which alone is toothed. Anal fin with 8 to 10 well-developed rays.

Vomerine teeth forming an isolated fascicle.—*Salvelinus*, charr.

Vomerine teeth forming a single, arched transverse series continuous with the palatine teeth.—*Hucho*, Huchens.



Figs. 1 and 2.—Vomer (lower and side views) of A (*Salmo salar*); B (*Salmo alpinus*).

The Salmon (*Salmo salar*)

The typical salmon may be described as a large anadromous fish of silvery colouration, with small black spots confined to the side above the lateral line, with the teeth on the shaft of the vomer disappearing in the adult (see Fig. 2, above), with 18 to 22 (11 – 14 + 7 – 9) gill-rakers on the first branchial arch, with 11 or 12 well-developed rays in the dorsal fin and 9 or 10 in the anal (the last ray often split to the base), with 110 to 125 scales in the lateral line and 11 or 12 (very exceptionally 13) between the latter and the posterior border of the adipose fin. The young salmon, "parr," or "samlet," characterised by a smaller mouth, the maxillary bone not extending much beyond the vertical of the centre of the eye, the presence of an alternating double or zigzag series of teeth on the shaft of the vomer, the presence of dark vertical bars on the sides of the body, together with more or less numerous small red spots, is hatched in the spring, and usually remains for about two years in the rivers, descending at the third spring to the sea, when it is known as "smolt." In the sea it soon assumes a more uniform silvery colouration, and from this state, or "grilse," develops into the adult salmon, which re-enters rivers to breed, after which operation, much emaciated and unwholesome as food, it is known as "kelt," and returns to the sea to recuperate. These different conditions greatly affect the appearance of the fish, and must be taken into consideration when comparisons have to be established with other allied species. It has now been ascertained by the investigations instituted in Norway by Dr. Dahl and Dr. Landmark that the smolts, immediately after leaving the rivers, make for the open sea, and do not return to the

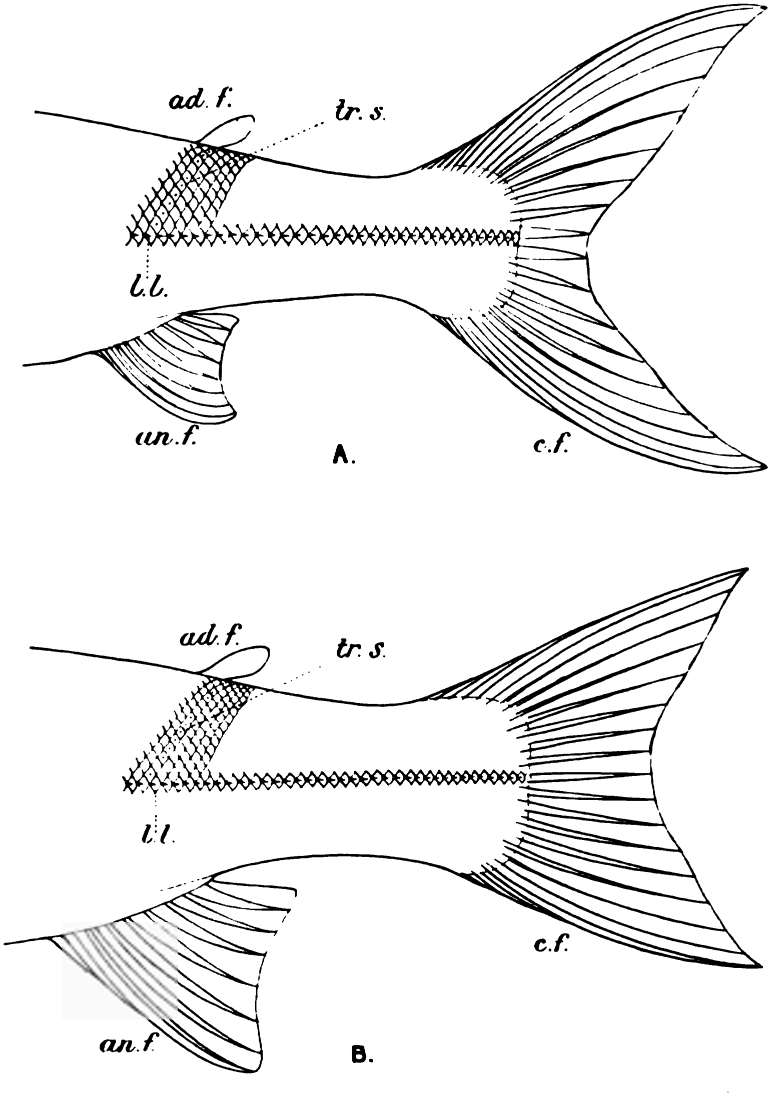


Fig. 3.—Caudal region of A, *Salmo salar*; B, *Salmo trutta*:—*ad.f.*, Adipose fin; *an.f.*, Anal fin; *c.f.*, Caudal fin; *l.l.*, Lateral line; *tr.s.*, Transverse series of scales between the adipose fin and the lateral line.

coast until they have reached the grilse stage. Thus specimens measuring between 8 and 18 inches hardly ever fall into the hands of the angler; it will therefore suffice, for the purpose of identification, to shortly describe the salmon in its parr state and in its adult condition. It should be mentioned, however, that very young males may have the genital glands greatly developed, and that such specimens (the *Salmo salmulus* of Jardine) are regarded by some observers as pertaining to a small species distinct from the salmon, although no one has yet attempted to draw up a definition by means of which this supposed species can be distinguished from the young salmon, and the question is still as it was left, in 1866, by Dr. Günther, who observes: "The salmon offers a most remarkable instance of irregularity as regards the age at which individuals arrive at maturity. Shaw has demonstrated, in the most conclusive manner, that these small salmonoids generally called *parr* are the offspring of the salmon, and that many males from 7 to 8 inches long have their sexual organs fully developed, and that their milt has all the impregnating properties of the seminal fluid of a much older and larger fish. That this parr is not a distinct species, as has lately been again maintained by Couch, is further proved by the circumstance that these sexually mature parrs are absolutely identical in their zoological characters with the immature parrs, which are undoubtedly young salmon, and that no parr has ever been found with mature ova. But whether these parr produce normal salmon, impregnating the ova of female salmon, or mingle with the river-trout, or whether they continue to grow and propagate their species as true salmon, are questions which remain to be answered."

Description of the Young.—The snout is short and rounded, not longer than the eye, which is ⅛ to ¼ of the length of the head; the maxillary bone extends backwards to below the middle of the eye. The anal fin is deeper than long, and when folded against the tail is separated from the root of the median rays of the caudal fin by a space usually greater than the least depth of the caudal peduncle (the part of the tail between the base of the anal fin and the root of the middle rays of the caudal fin). The caudal fin is deeply notched. Colour greyish to olive above, whitish beneath, shining silvery; two or three large, round black spots on the gill-cover; smaller blackish spots on the body above the lateral line; red or orange spots about the lateral line; 9 to 15 dusky cross-bars (parr-marks); dorsal fin frequently with more or less distinct dusky or black spots, and with a more or less marked light antero-superior edge; anal fin with a more or less marked light (sometimes orange) anterior border; caudal fin greyish or blackish, without spots; adipose fin sometimes tipped with orange or reddish.

Description of the Adult.—The snout is more pointed and longer in proportion, much produced in the male, in which it assumes, as well as the lower jaw, a hooked shape; in old males the hook of the lower jaw is often one inch long or even longer, perforating the upper jaw; eye much smaller in proportion the larger the specimen, its diameter being contained from 5½ to 10 times in the length of the head; the maxillary bone is narrower in proportion, and reaches nearly to the vertical of the posterior border of the eye, or a little beyond. The anal fin is not or but little deeper than long, and when folded against the tail its length is not greater than its distance from the median rays of the caudal fin. The length of the caudal peduncle is at least twice as great as its least depth. The caudal fin is less deeply notched and becomes truncated with advancing age. Colour greyish to blackish above, white or whitish beneath; rounded or X-shaped black spots are often scattered above the lateral line and on the upper half of the head; often one, two, or three larger black spots on the gill-cover; rarely a few black spots below the lateral line about the shoulder; dorsal, caudal, and pectoral fins grey or blackish, without spots, rarely with a few spots on the dorsal; anal white, greyish internally. When leaving the sea, salmon are of a brilliant steel-blue on the back, but after they have passed some time in fresh water, as the breeding season approaches, this brilliant sheen is replaced by a muddy tinge, the female becomes blacker, and the male, then called "red-fish," puts on more or less numerous orange or red spots on the body, and streaks of the same colour may appear on the cheeks.

The hook or knob at the upper surface of the end of the lower jaw of the breeding male disappears by the time the fish has become a well-marked kelt. The question has often been raised how this reduction can take place. Dr. Gadow, as quoted by Day, gives the following answer:—"The hook consists entirely of fibrous connective tissue, without any traces of cartilaginous cells in it, the whole being surrounded by the epiderm. Therefore, the hook cannot be looked upon either as an outgrowth of the bones of the lower jaw, or as a sort of horny excrescence like horns, nails, or pads, such as toads possess on the palms of their hands, but as a periodical outgrowth of the cutaneous connective tissue which surrounds the body, being situated between the epiderm and the bone, without, however, having any relation to the periosteum. This cutaneous connective tissue nature explains why and how the hook can again be absorbed, or rather re-absorbed, after the season is over. Certainly it cannot be shed."

In a recent number of the *Field* (ci. p. 593) Mr. Alfred George affirms, as the result of his observation, that the beak of the cock-salmon drops off: "When the fish reaches a certain stage in the kelt state, the hook gradually loosens at what seems a kind of joint just where the point of the nose should be in the fish; a slight tap when it has arrived at that stage, or slight pressure on the gravel on the part of the fish will then dislodge it. I have dislodged many. The fish after this is rather snub-nosed, and the point is rather indented and light-coloured, but it soon wears smooth and resumes its proper shape." The question, therefore, remains an open one, on which further observations are much needed.

The salmon attains to a length of four or five feet. The average weight of the adult is probably about 15 lbs., and the maximum 70. Records of fish of 84 lbs. and upwards have appeared, but have not stood the test of closer inquiry; a frequent source of error in this matter is confusion with the Pacific salmon of America, which grows to a much larger size than the Atlantic species. Apart from the land-locked races, to be mentioned further on, the salmon does not vary much in size, the reason being, as pointed out by Dr. Günther, that they find the same conditions in all the localities inhabited by them, whereas the species which are confined to fresh waters differ considerably according to the localities where they occur; this uniformity of conditions also accounts for the greater constancy in form and scaling which we observe in the salmon as compared to the various species of trout. Any one looking at fish on a fishmonger's slab cannot fail to be struck by the uniformity of appearance of a number of salmon of the same sex, in marked contrast with the variety of form and colouration of the allied species, *Salmo trutta*, taken in the wider sense.

Distribution.—The salmon inhabits the North Atlantic and its tributary waters. It is known to extend as far north as Scandinavia, Lapland, Greenland, and Labrador, and as far south as the northwest of Spain and the State of Connecticut. It ascends the Rhine as far as Basle. Through the agency of man it has been introduced in the Antipodes, and, although the experiment has not met with the same success as in the case of the European and American trout, adult salmon have now and then been captured in New Zealand, specimens received from there being preserved in the British Museum. Attempts to introduce the fish in the lakes of Switzerland and in the French rivers flowing into the Mediterranean have been a failure.

Land-locked Salmon.—The question whether the land-locked forms occurring in Scandinavia and in Canada and Maine, which are regarded by some authors as distinct species, should be accorded more than the rank of races, is still open. Dr. Günther, in 1866, believed them to be distinct species, whilst Day and Professor Smitt would admit but one species of salmon. Dr. Jordan, in 1888, expressed himself in favour of the latter opinion. "I have compared," he says, "numerous specimens of the common land-locked salmon of the lakes of Maine and New Brunswick with land-locked salmon from the lakes of Sweden, and with numerous migratory salmon, both from America and Europe. I can have no hesitation in regarding them all as specifically identical. The differences are very trivial in kind, and not greater than would be expected on the

Hudson & Kearns.

2.--FRESH RUN FISH.

3.—A HUNGRY KELT.

hypothesis of recent adaptation of the salmon to lake life." Quite recently, however, in his "American Food and Game Fishes," written in collaboration with Dr. Evermann in 1902, he reverts to Günther's opinion, without, however, adducing any very convincing reasons in favour of the specific distinction. The name *Salmo hardinii* has been proposed for the salmon of Lake Wenern, the "Deijefors Lax" or "Silver Lax" of Lloyd, that of *S. sebago* for the form of Sebago Lake in Maine, and that of *S. ouananiche* for the "Ouananiche" or "Little Salmon" of Lake St. John, Canada, and neighbouring waters of Quebec, also perhaps of lakes in the interior of Labrador. These non-migratory forms are smaller than the typical salmon, never exceeding a weight of 25 lbs., the Ouananiche, the smallest of all, rarely weighing 7½ lbs., and averaging 3½. The American fish often differ from the typical salmon in having numerous black spots below the lateral line. Although spending their whole life in fresh waters, the habits of these fish are very similar to those of the sea salmon, ascending tributary streams to spawn in their higher ranges, and then returning to the deep parts of the lakes, which are to them what the sea is to the anadromous Salmonids.

THE HUCHEN (*Salmo hucho*)

The salmon of the Danube or Huchen is distinguished from the charr, to which it is more nearly related than to the true salmon and trout, in having a single series of teeth across the head of the vomer, this series being arched and continuous with that on the palatine bones (see Fig. 5, p. 470). It is a large species, growing to 6 feet and attaining a weight of 100 lbs., with flat, pike-like head, and elongate body covered with moderately large scales, there being 135 to 160 in the lateral line; the anal fin contains 12 rays, 9 of which are branched. The colour is silvery, with numerous small, black dots, extending on the dorsal fin.

This section of the genus *Salmo* is represented in Asia by two species, *Salmo fluviatilis* of Siberia, and *S. perryi* or *blackistoni* of the northern island of Japan.

HYBRIDS BETWEEN DIFFERENT SPECIES OF *Salmo*

It has long been admitted that among these fishes hybrids are occasionally produced in a state of nature. However, most cases on record were based on mere assumptions derived from the appearance of certain specimens, showing a more or less distinct blending of specific characters. The experiments carried on some twenty years ago by Sir James Maitland at Howietown, and reported upon by F. Day in his "British Salmonidæ" show that crosses may be produced artificially between salmon and trout and even between such widely different species as the trout and the American charr, and that these hybrids are themselves fertile to a limited extent, and may be successfully crossed with the pure parent forms. Zebra hybrids is the name applied by Day to the cross between the Lochleven trout and the American trout, and Struan hybrids designates the cross between American and British charr.

INTRODUCTION IN THE ANTIPODES

The history of the introduction of Salmonids in Tasmania has been told by Mr. Morton Allport in a very interesting paper published in the *Proceedings of the Zoological Society of London* in 1870. After several unsuccessful attempts the first consignments of fecundated ova of salmon and brown trout arrived in Hobart on the 17th April 1864, having been ninety days on board, packed between layers of damp moss in deal boxes covered with ice. These ova were placed in suitable ponds, where about 3000 salmon and 300 trout were successfully hatched. A second importation of about 103,000 ova of salmon and of 15,000 ova of sea-trout took place in 1866, of which about 45 per cent. arrived in a living condition. The ponds in which the fish were bred communicated with the River Plenty, and after a time the perforated zinc obstructions which had been put up were removed, so that such of the fish as chose to leave found their way into the river, and thence to sea. On the 3rd July 1866 ova and milt were taken from the first pair of trout (*S. fario*) which ever arrived at maturity in the Antipodes, and shortly after many more bred in the river. In 1867, large trout (up to 17½ inches in length, and weighing 3 lbs.) were taken in the Plenty. The bulk of the salmon smolts of the first shipment had left the river in October and November 1865, and in February and March 1867 several persons reported having seen salmon or grilse in the fresh waters of the river Derwent, none, however, being caught. All attempts to take fish having failed up to 1869, the Fish Commissioners came to the conclusion that the first undeniable proof of the success of the experiment would be the capture of parr or smolts in the coming spring, as such parr or smolts could only be the progeny of fish returned from sea, the last of the smolts from the transported ova having left the ponds in the spring of 1868, and being therefore either dead or approaching grilsehood. This expectation was realised in October and November 1869, when several smolts were netted in the sea near Hobart, and pronounced by the Commissioners to be true salmon. One of these specimens had been transmitted to the Zoological Society, but upon being submitted to Dr. Günther was determined by him to be a dwarfed example of *Salmo trutta*, and not a *S. salar*, a determination against which Mr. Allport protested at the time, with good reason, as the specimen, preserved in the British Museum, is unquestionably a true salmon.

The trout had proved a complete success. Not only had they thoroughly established themselves, but in November 1867, Mr. Ramsbottom, who had so successfully brought over the eggs from England, left the ponds at the Plenty with 270 trout-fry in an apparatus of his own arrangement, and landed in Melbourne on the 15th with 248 living fish which were introduced in Victoria. In the following year large numbers of fertilised ova were sent out to Victoria and New Zealand.

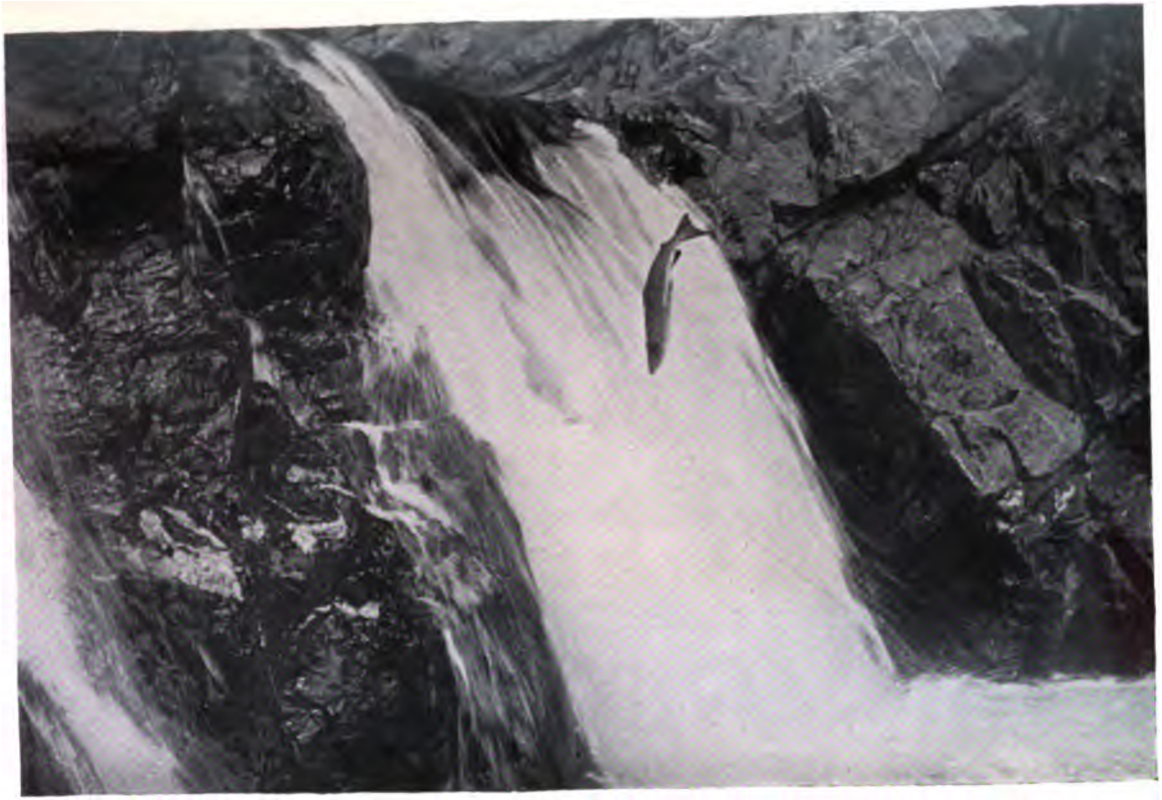
A very full account of later introduction is to be found in Mr. Arthur Nichol's "Acclimatisation of the Salmonidæ at the Antipodes: its History and Results" (London, 1882). The later importations have been of salmon, trout (sea and fresh-water), Pacific salmon (*Salmo quinnat*), charr (*S. alpinus*), and rainbow trout (*S. irideus*), but, except for the trout, it cannot be said that these experiments have been a success. Although true salmon have repeatedly been caught in the estuaries and on the coasts of Tasmania and New Zealand, most of them have disappeared, and the hope of their taking to regular migration in the Antipodes has not been realised.

It is well to add that the credit of the introduction of Salmonids in the Antipodes, sometimes ascribed to Frank Buckland, is really entirely due to James A. Youl, who planned and carried out the whole scheme.

The subject is brought nearer up to date by papers published in the *Proceedings of the Royal Society* *of Tasmania*, by Mr. Saville Kent in 1887, and by Mr. P. S. Seager and Mr. R. M. Johnston in 1888.

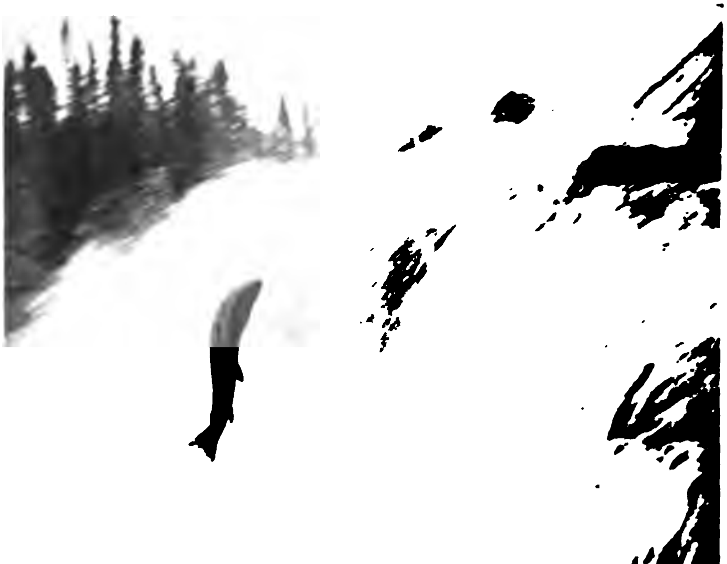
On the introduction of salmon, trout, and other Salmonids (*S. quinnat*, *S. fontinalis*, *S. alpinus*, *Coregonus albus*) in New Zealand, *cf.* W. Arthur, "History of Fish Culture in New Zealand," *Trans. N. Zeal. Instit.*, xiv., 1881, pp. 180–210.

Commenting on the acclimatisation of the true salmon in Tasmania, and on the failure of retaining it in those waters after its descent to the sea, Mr. Saville Kent, in 1887, suggested that the cause of the failure is to be found in the higher temperature of the sea in that latitude as compared to that in which the species flourishes in the northern hemisphere, the fish wandering away to colder regions. He added: "In search of a more congenial clime, the salmon might proceed south towards the southern coast of New Zealand, or to Patagonia, or to the Antarctic ice-fields. Or, possibly, following a uniformly cold abyssal route, they might reappear upon the shores of Japan or North-Eastern Asia, and in which latter region they might have advanced far towards coming in contact again with the northern representatives of their own race. In this connection it is of interest to remark that some few years since the report was circulated that a large number of salmon had been taken on the coast of Japan, and it was suggested at the time that these fish had developed, and possibly emigrated there, from fry originally liberated in Tasmanian waters."



4—A FAILURE.

A BOLD LEAP.



5.—AN EIGHTEEN-FOOT JUMP.

As a matter of fact, no true salmon have ever occurred in Japan, as we know from the recent investigations of ichthyologists, and the salmon to which allusion was made was no doubt one of the *Oncorhynchus*.

[With regard to the practical failure of all attempts at the introduction of salmon in the rivers of the Antipodes, or at least at permanently establishing them there, it has to be borne in mind how very small is the proportion of salmon that, even in this country, come to the degree of maturity indicated by grilsehood in comparison with the number of ova laid. A very low computation of the average of eggs laid by a female salmon puts the number at ten thousand. Presumably she does her duty towards keeping up the stock, if two of these come to maturity. The enormous percentage of loss is therefore perceived at once; and it is further perceived how vast must be the number of ova hatched before, according to any calculation of chances made on the basis of experience in this country, it could be expected that a grilse should return. Yet even this calculation is not nearly as unfavourable to the chances of the young salmon's return as the circumstances of fish life in the Antipodes require; for not only do the young salmon run as many risks in their descent to the sea as they run in our rivers and estuaries, but, according to the evidence of all who have studied the question over there, they run infinitely more. The coasts of the Antipodean

Colonies seem to be beset by a large number of carnivorous fish of some size, to whom the poor little smolt descending from the nurseries up the river would seem the most delectable morsel in the world. The young salmon has enemies far more numerous in those seas than in our own; and if his chances are so small here, what can they be under those other far less favourable conditions? Naturally the fish, such as brown trout, that do not go down to the sea have a better chance of acclimatisation, and we find them, accordingly, doing remarkably well.—Ed.].

CHAPTER II

SALMON: THEIR FOOD AND FEEDING

By Dr. J. Kingston Barton

The Food and Feeding of the Young Salmon.—The young of salmon from the moment they are found in the stream take in nourishment, which is digested in the stomach and its appendages. The nature of their food is exactly the same as that of the ordinary brown trout. If fry, parr, or smolts be opened at any season they will always be found to contain the remains of insect food. On a few occasions I have examined smolts taken in the semi-tidal pools, and they did not contain quite such full feeding as the parr taken higher up the rivers. The only point of interest in connection with this branch of the subject is the question whether a particular river has insect and underwater food enough for both salmon and trout, or whether, perhaps, only enough for a limited number of young salmon.

There are many rivers, especially in Scotland, where, from the rapid character of the stream, there is very little plant-life, and consequently very little insect-life, as the latter is so much dependent on the former. Rivers which have long stretches of sluggish water interposed between the rapids, generally support a good head of trout as well as of salmon, especially if there are weeds in the water and trees by the banks. It is in this kind of river that the pike, when once introduced, commit such havoc.

In rivers like the Shannon, which have so many tributaries and so many lakes interposed in their course, there is food life in the water sufficient for any amount of salmon and trout; but when one studies some of the short swift rivers it becomes at once apparent that the amount of insect-life in the river is so measurable that it can only afford nourishment for a limited number of the young of the Salmonidæ.

This question of the food supply is of great importance, for whenever there is a Fishery Board to govern a river or district, the first point to decide is the protection of salmon, and it should be their duty to find out whether that particular river can give proper nourishment to the young of salmon, sea trout, and brown trout. If it is decided that

6.—GOING OUT TO "HARL."

7.- THE FINAL ACT.

it can do this, then it is easy to form bye-laws suitable to all interests. But, on the other hand, if it should appear that the river can only support a limited number of the young of migratory salmon, there will arise the truly delicate point of deciding for the river which variety of fish is to be encouraged by special bye-laws. One may take it as true that the nearer the natural laws are followed the greater will be the success of a river.

The commercial value of the fisheries will probably always determine the trend of the regulations for the preservation of one or other kind of the Salmonidæ, and with the ever-increasing diminishing waters owing to increased drainage and the power of water companies to tap rivers for the supply of townships, it will become more difficult and trying to decide between the conflicting rights.

The commercial value of salmon must far outweigh the value of sea trout or of brown trout: (1) Because weight for weight the flesh of fresh run salmon commands a better price for its edible qualities; (2) there cannot be a very great difference between the size of smolt salmon and smolt sea trout, and hence, size for size, the return of a 4-lb. grilse which next season may be a 12 to 20 lbs. salmon must far exceed the value of a sea trout of similar age.

Where sea trout (*e.g.* bull trout in Coquet) have no opposition in their struggle for existence they do obtain greater dimensions than in mixed rivers. (See *Field*, 18th October 1902, for authentic report of one bull trout 40 lbs., and one 25 lbs., taken from the Coquet River about this date.) Yet for all that, the sea trout cannot compare with salmon in commercial value.

Only in a very few rivers (and these generally of short course) in Scotland, Ireland, or Wales, do the ownership of the upper fishery (rod) belong to the same proprietor as that of the estuary, when of course it can be entirely in the hands of the owner to find out the fullest yield for net or rod.

When the food limits for samlets can be measured, then of necessity there must be a limit in the amount of parent fish that are sufficient for the maintenance of a sufficient head of salmon in the river.

Recognising the ever-varying characters of the seasons as regards excess or want of rain, one can realise that under natural circumstances the amount of fish returning to the river each year must also ever vary, unless artificial hatcheries are maintained to keep up an artificial regular supply.

The general evidence to date is, that after young salmon hatch out they seem to divide into three schools of progress. A certain number thrive rapidly and go to sea as smolts at the end of their first year of life. A larger number would seem to depart when two years of age, and a small proportion seem to require even three years to mature to the smolt or sea-going stage. All this, while each season's output of successful spawning requires feeding and protection from natural as well as human enemies.

The Descent of Smolts to the Sea.—The second stage in the life-history of the salmon is the departure of the smolts to the sea, this taking place as a rule in late spring or early summer floods. It is said there is also an autumn departure, but of the big migration of smolts in the earlier part of year there is no doubt. In many rivers this was a favourite time (happily in the past) for the local rodsmen to take fearful toll of these unsophisticated fish as they passed over the shallows.

In all rivers containing salmon and trout the unfortunate young samlets suffer terribly from their partiality to any of the baits used for the capture of trout. The longer the trout season lasts, and the less severe the rules of the particular river may be with regard to the return of small fish, the more heavy will be the destruction of these young samlets.

The Feeding of Salmon when in the Sea.—From the time of the departure of the smolts to seek food in the sea until their first return as grilse (young salmon) or as young spring salmon, is a favourable opportunity to discuss the food or feeding of salmon when at sea. The marking of fish (see Calderwood, in part ii. of the Scotch Fishery Boards. Twentieth Annual Report, 1902) proves what remarkably good feeding fish get when at sea, that is, judged by the great increase in weight that takes place within a few months.

Sir Humphry Davy remarks that the teeth of salmon would indicate that the fish preys and feeds on larger material than simply ova and small crustacea.

Naturalists draw our attention to the character of the teeth in salmon as indicating the voraciousness of their appetite. In studying historically what has been observed and noted concerning the nature of the food of salmon, every one agrees that the remains of the fresh herring is the most frequently found nourishment within the stomach and intestines of clean run salmon taken in nets at sea or within the estuaries.

Even in these days a few people believe that the feeding of salmon at sea is a mystery. But quite sufficient observers have found at various times that when salmon are taken in the nets, especially in the sea, in a fair proportion (10 per cent.), abundant food remains are found.

In the greater number of cases herring is the food with which *Salmo salar* has gorged itself. This is so in fish taken in the North Sea, German Ocean coasts, and off the Scotch or Irish coasts.

In more than half of the fish examined by myself which had food remains the herring was the victim found within the salmon's stomach.

Sand-eels lesser, and occasionally greater, come next, then young whiting and haddock, and less often crustaceans.

The red colour of salmon flesh is supposed to be due to the effect of crustacean food, but the contents of food found in salmon do not bear out this theory.

At certain seasons herrings are found to feed very freely on a red crustacean (notably in the autumn in Loch Fyne). It is possible that the red colour of the salmon's flesh may be due to the herring having fed on crustacean rather than the salmon feeding directly on this species of food.

Dr. Alexander Morrison in *Highland Society*, vol. ii. (1803), says he has taken within the flood-mark salmon with two and with three full-sized herrings in their stomachs.

Yarrell (1836–1859) says that of the many observers who have examined the stomachs of the salmon to ascertain the nature of its food, few have been able to satisfy themselves as to the exact food which causes such wonderful rapid growth when in the sea.

Faber in "Natural History of Fishes in Iceland," says the common salmon feeds on small fishes and various small marine animals.

Dr. Fleming says their favourite food in the sea is the sand-eel. In Sutherlandshire estuaries the sand-eel is a favourite bait.

Dr. Hamilton on "British Fishes," part ii. (from the Naturalists' Library), 1848, says the food of salmon in the sea consists of sand-eels and small fish, ova of Echinodermata, and certain crustacea. But in the rivers he says they feed on worms, aquatic insects, and small fishes. He admits that it is not possible to recognise the nature of their food when they are opened and examined after being captured in fresh water.

Professor W. C. M'Intosh seems to have been the first to describe careful and scientific examinations of over 100 fish taken from the Tay estuary about 1861 (Linnæan Society, 1862), and he notices about 10 per cent. of these fish had slight recognisable food remains. As most of these fish were taken in Messrs. Speedy's nets, it is certain they were fish not long from the sea, and not high up in the river.

Buckland in the Nineteenth Annual Report for England and Wales, 1879, says that he thinks herrings are the staple food of salmon at sea.

Miescher Reusch, in 1880, says that fish taken in the North Sea very often contained herring.

In the Fourteenth Annual Report of the Scotch Fishery Board for 1895, part ii., there is a very interesting series of notes of the interior of the digestive organs of a large number of fish from the river Tweed examined between January and November. Out of a total of 823 examinations made of male and female salmon and male grilse, food remains in variable quantities were recognised in 81 or nearly 10 per cent.

In 35 the food consisted in the remains of the common herring, and 22 had sand-eels or whiting, or haddock. Crustaceans of different kinds were found in 18 fish.

Dr. Warwick Brown, in *Zoologischer Anzeiger*, 1898, says he found food remains in salmon recently from the sea, but does not particularise.

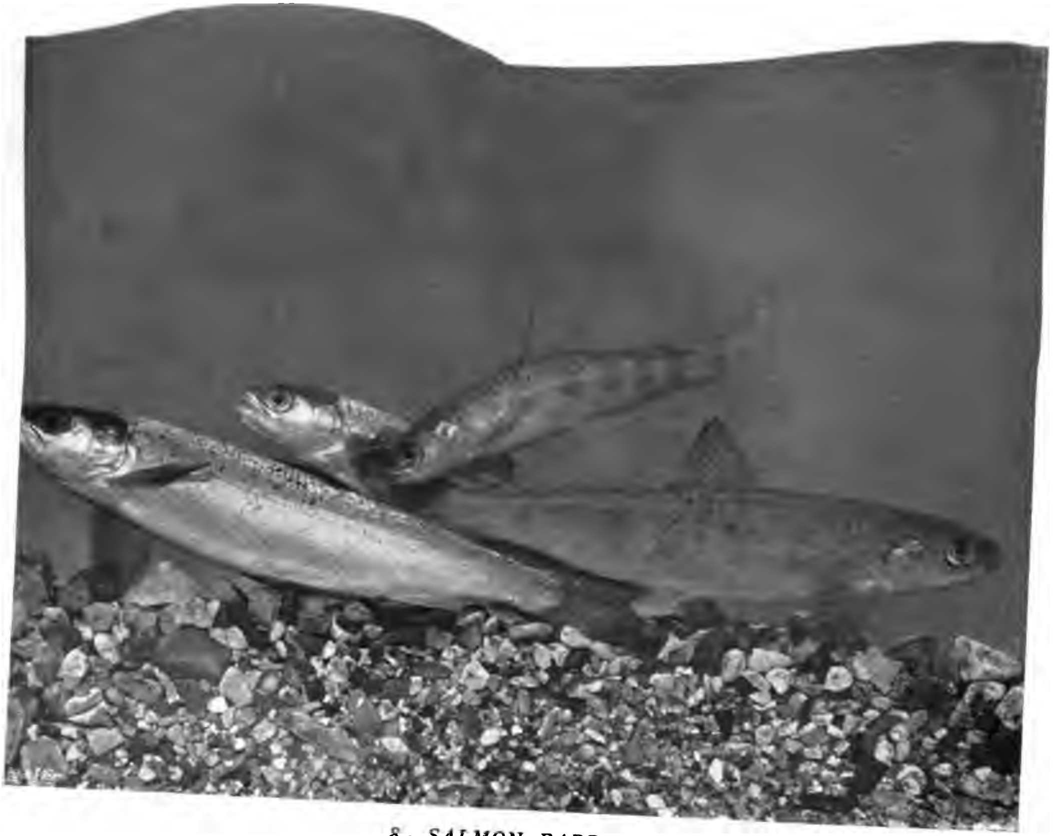
In 1899, between 28th April and 29th July, I examined the interiors of 230 salmon purchased at Billingsgate market, and reported in every case to be net-captured fish from Scotland, Norway, and west of Ireland and England (but chiefly from Scotland), and in 15 the remains of food (in 7, sea herrings) were recognisable. In one instance six herrings were in the stomach of a salmon. In 95 there were the remains of last stages of digestion, and in the other 120 fish practically no traces of food were to be found.

It being so very evident that all the salmon of the rivers in the north part of Europe feed principally on herring, it would be well to study a little more the life-history of herring, as indirectly some light may be thrown upon the life-history of salmon.

In the Scotch Fishery Board's Seventeenth Annual Report for 1898, part iii., is a most interesting résumé of the natural history of herring by Dr. Heincke, of Heligoland. The essence of this is to show that herring live in large shoals, which seem to keep together, but move to and from their breeding areas near shore and their feeding grounds in deep water. There seems two such great movements each year, these taking place in spring and autumn. It would not appear that the same fish breed twice in the year, but rather that the smaller sized fish breed in the spring and the larger in the autumn.

Each shoal of herring seems to keep to itself, and its range of movement is not of large extent. At the same time there would seem to be very many such shoals in all the seas which surround the British Islands. At present there is no evidence to prove that salmon seek out these deep shoals and feed freely, but these herring are not fished for in deep water, but only when they come near the surface and shore for their breeding purposes, and thus meet the salmon on their way to the estuaries.

The herring also ceases to feed when once the sexual organs begin to maturate, so that for a good many weeks previous to spawning these fish are also found, like the salmon, to be empty of food remains. Herring are extremely well nourished, and have stored up fat and albuminous material which is transposed into the development of ova and milt. When spent the herring is a poor and ragged creature, exactly like the kelt salmon; and from like reasons, namely, performing a great vital energy whilst going through a physiological fast. Commercially this absence of food remains has a great economic value. All healthy animals, fish, fowl, &c., which are empty of the products of recent digestion, keep sweet, and free from early decomposition, and are thus much more marketable and valuable. This emptiness of the herring and the salmon in their well-nourished condition, when they come near shore and get entrapped in the nets, affords the fishcurer a splendid opportunity of saving food for the market, and the salesmen an equally good chance to have their salmon in an easily kept condition. If spent herrings are caught in the nets they are of very poor value. But if herrings,



8.—SALMON PARR.

which happen to be full of food, are captured, they are quite useless for commercial purposes, as they decompose so quickly. Dr. MacFadyen in a recent lecture on foods mentions that the herring occupies the first place for nutriment and digestibility combined.

The Non-Feeding of Salmon when in Fresh Water.—With the return of the salmon after it has grown from a smolt to a grilse (salmon of first return from the sea), or as spring fish recuperated after previous kelthood, comes before us the whole question of the life habits of salmon in fresh water, which seems more than ever to have excited general interest, and specially so as it is during this stage of its existence that full-grown salmon cease to feed. It is round this question of non-feeding in fresh water that so much doubt and mystery seems to hang. Not that it really need be so, as there is nothing strange in a well-nourished animal going through a long fast at some stage of its sexual development. All naturalists and observers of any truthful care dwell on how seldom is any recognisable food remains found within the digestive organs (stomach and intestines) of fish taken by rod and line within fresh water.

Wild fish placed in confinement will often go three, four, or more months without feeding, and yet losing but little weight; as long as the water is aerated they will exist. Now salmon in the deep pools of salmon rivers are but a wild fish in confinement, and partly from fear and shyness they hide away at the bottom, fighting no battle of life to call upon their resources; whilst close on to the breeding season, then they do have a most serious claim upon their strength. Then is indeed seen how they lose weight and condition from the fact that they have to provide for this wear and tear and loss by yielding up from the storehouses within themselves. Clean fish weighed at lengthened intervals are found to lose but little weight, but after the breeding season the kelt salmon is found to have lost immensely in weight from the loss of sexual products, which in its turn was manufactured out of transposed nourishment stored up in the flesh.

Some scientists (in the Scotch Fishery Board Reports, 1891) tried to prove that the reason why salmon did not feed in fresh water was because the fish were found suffering from an intestinal and gastric catarrh which quite forbade of any digestion. It was quickly found out that this theory was founded upon the fact that proper precautions had not been taken in chemically fixing or preparing the intestines of fish. So this theory becomes untenable. I myself proved conclusively that the digestive organs of salmon taken by rod and line in the spring, summer, and late autumn were absolutely normal, therefore showing there must be some other reason for the non-feeding of salmon in fresh water. When one remembers the large size of many salmon, and realises how little food there could be in any river for supplying nourishment to salmon if they kept up the appetite they evidently have when at sea, one can fully understand why nature has caused the fish to be able to exist without feeding for so many months, as it certainly can do.

From early in December clean fish begin to run into many rivers, and gradually as the new year advances more such fish enter in various numbers, but generally in schools or shoals at a time, until the late autumn, when in most rivers large numbers of fish enter just in time for the spawning. Early and late rivers are differentiated by the fact that in the former fish enter early in the year, and in such rivers, as a rule, the fish spawn early, *i.e.* November rather than in December, when most salmon spawn. One point comes out very strong, and surely proved after the examination of fish all the year through, and that is that the earlier in the year any salmon, male or female, be examined, the less developed will the sexual organs be found, but as autumn draws on the larger will be the size of the sexual development. With this difference the early fish of a late river will be nearly as backward as the early fish of an early river, even if three or four months separate these fish. But towards autumn the organs approximate more nearly, as the greatest differences of time in maturation of late and early rivers as regards spawning is but a matter of a very few weeks.

The evidences which may be taken as conclusive that salmon do not feed in fresh water, are so numerous that one puzzles at the unbelief of which fully explain the ability of the salmon to sustain life for so many months, as it evidently does do, without food whilst in fresh water. The enormous loss of weight at spawning fully bears out this fact of non-feeding.

The Scotch Fishery Board in their scientific Report for 1898 proved how all the up-river fish examined contained no food remains, and although the theory advocated by them to explain this non-feeding habit of the salmon has been shown to be absolutely fallacious, yet the fact remains that their contention that the fish do not feed when once in the rivers is without doubt correct.

Dr. Spence, of Edinburgh, very kindly sent me a list of 58 fish captured by him in rivers, and although recognisable food remains were found within three of these fish, yet it was admitted such fish might have been recently fresh run from the sea.

I have examined a good many river caught fish, and have never found recognisable food remains in such fish. If food is to be found in a rod and line caught river fish that is not fresh up from the sea, it will be in a fish which has recently moved in actual flood time. In sea trout, taken in flood time up river, food remains, partly digested minnows or young salmonids, are undoubtedly found, but it is wonderful how difficult it is to get *authentic* evidence of fresh-water food being found within a true *Salmo salar* taken in fresh water by rod and line. Of course, it is not impossible, and, moreover, is quite probable that an odd salmon does very occasionally take natural food when once settled down in fresh water, but the number of such fish is very small, and still smaller will be the number caught which are found to have recently partaken of food.

We have already alluded to the similarity in the life-history of herring, as showing how even a marine fish ceases to feed when once the sexual organs begin to maturate. This fasting may last over weeks even in the more active life of a sea-going fish.

When once salmon enter a river, however long the interval till the spawning, and that may in the very early run fish be eleven months, yet during this interval it never returns to the sea to feed. There is evidence to prove that clean salmon in the tidal pools of a river within easy access of the sea will drop back to the brackish water pools in seasons of very low water, but this is understandable. There is, however, no evidence to prove they do so for the purpose of seeking nourishment.

Having once exploded the theory that the fish did not eat because they were in a state of disease (a sad state with lovely clean run fish), it is easier to understand why fish do occasionally take baits with evident appetite. But all such fish when examined are very rarely found to contain food remains, and considering the large number of fish that can be in a pool and the small number that will be caught with any bait, if fished fair to avoid foul hooking, one understands why it is so when one knows that the salmon is not on the look-out for food like the other river fish.

Local fishermen of the non-poaching class know quite well how useless it is to fish for salmon, excepting when all the points are favourable; and the essence of this favourable time is that fish shall be new in a pool after a fatiguing move up, and the waters must be falling or just come to be low and clear. Then, and for a short time only, will fish be tempted to take any bait, however nice and however skilfully put before them. Knowing that the digestive organs are only in abeyance, one can quite easily understand why a tired and slightly hungry fish will dash at a morsel that simulates some foods of its liking. One only of Dr. Spence's fish, a salmon female 8 lbs. weight, from river Dee, contained the vertebra and soft parts of a small fish within the stomach, but no food remains were found in the intestines. Unfortunately the small fish was not distinguished, so that whether it was a fresh-water fish or not remains in doubt. Still it is the only scientific record I have found of a fish (salmon) caught in fresh water having food within the stomach but no remains in the intestines, therefore answering the question whether salmon may not occasionally feed when in fresh water.

Concerning Kelts.—The more puzzling question is why kelts do not feed sooner than they appear to do; but a few, chiefly anglers, believe kelts to be most voracious feeders. Yet it is very difficult to catch kelts in the act of feeding.

On several occasions, in past Reports of the Fishery Board, categorical evidence on this point proves that kelt salmon do not feed at all freely whilst still in fresh water. Frank Buckland, one spring-time (very early in the season), examined with great care some 300 kelts seized at Billingsgate, and in no instance did he discover any recognisable food remains.

The few kelts I have examined show that in the early months of the season, *i.e.* soon after spawning, they are absolutely empty of food remains. But by March and April there is a slight amount of fæcal mucus suggestive of some small feeding. The microscope would appear to prove that some fat has been absorbed by the intestines of kelts captured in the tideway; but even these tidal kelts most certainly do not feed with any freedom. The marking of kelts (see Mr. Calderwood's reports) shows that as long as kelts remain in fresh water they certainly do not increase in weight, although they improve so much in condition and appearance. The ocular demonstration of food remains within kelts seems to be very rare.

Meischer Reusch, in the many examinations he made, only twice found food remains in any salmon, and these two occasions it was in kelts that he found in one case the spine of a fresh-water fish, and in the other instance some scales of a cyprinoid fish. For the same reason that it is well spring salmon do not feed in fresh water, so it is a good thing the kelts refrain from feeding on the young of trout or even their own offspring.

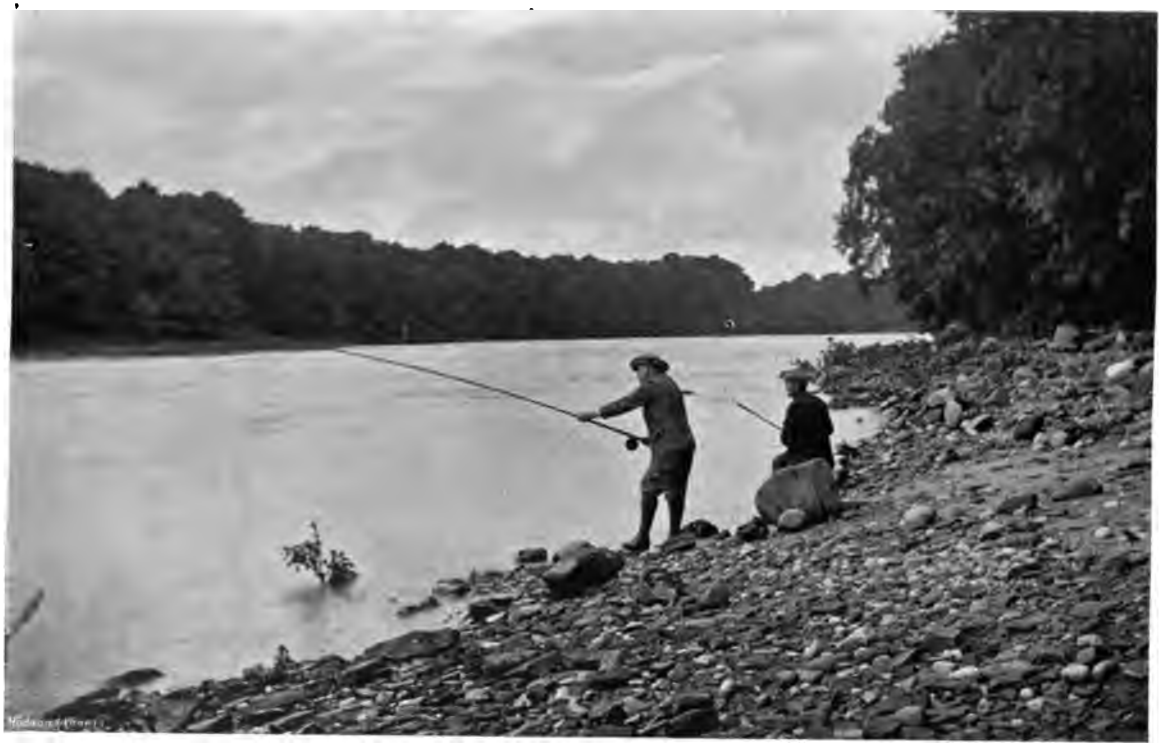
The only undoubted evidence of kelts being positively seen to feed is that furnished by my friend Dr. Hamilton-Bland, who one spring, in the county of Kerry, put two kelts into a salt-water tidal pond with other sea fish, and he actually fed these fish with small coarse fish, and he affirms the salmon would rush at the food (see *Field*, April 13, 1901).

It is very fortunate that the kelts cannot be proved to be cannibals, for one of the most certain ways of keeping up the species is by the preservation of healthy kelts.

With the disappearance of the kelts in the sea, the complete cycle of the salmon has been described.

Formerly it was presumed the salmon came into the river entirely for the instinct of breeding. But now we are asked to believe they do not come into the rivers specially to breed, but rather that they go out to sea to feed. At all events, they cannot breed excepting in fresh water, and they will not feed excepting in the sea, and when once well fed, they return to the fresh water irrespective of the state of maturity the sexual organs may have arrived at, and we may therefore believe the salmon is a fresh water fish, which spends its first stage of existence to the smolt stage in fresh water. It then proceeds to sea to gain food enough to become adolescent (grilse). At this period it returns to fresh water sexually perfect, and having contributed its quota to the winter spawning, it descends as a kelt to the sea in early spring, to return again as a full-grown salmon the same year or the next, according to circumstances.

[Even while this chapter was passing through the press, a somewhat fierce controversy was in progress in *Country Life* and elsewhere over a theory of salmon migration suggested to the Editor of this series by Sir Spencer Walpole—a theory that in some measure depended on the answer to the question raised here by Dr. Kingston Barton as to whether the salmon in its origin was a salt or a fresh water fish. The view of Mr. Boulenger, expressed, however, with some reserve, is in favour of a marine origin for the salmon, but his evidence pointing to that conclusion is mainly, as he frankly admits, of the negative kind. The strongest point in favour of the fresh-water origin would seem to be that salmon can thrive and keep up their stock in land-locked fresh waters, whereas without access to fresh water they perish, for salt water is fatal to the ova and the fry. This fact in itself seems strong argument for the fluviatile origin of the salmon as we know him now, although it is more than probable that his ancestors of an earlier type were marine in their habits. The theory that provoked the controversy was that salmon, in their migration to the sea, follow the track through the ocean of the river beds down which their ancestors passed; for it has been well ascertained, beyond reasonable doubt, that within times later than the evolution of the existing type of *Salmo salar*, Great Britain was separated by no more than a river from the Continent (along a certain line probably by not even that slight means of division), and that the shores of Great Britain and Ireland were much nearer each other than they are now, the effect naturally being that the beds of the old rivers lie for many miles of their course under the present sea.—Ed.]



10.—CASTING FROM THE BANK.

11.—READY WITH THE NET.

CHAPTER III

THE NATURAL AND ARTIFICIAL REPRODUCTION OF SALMON AND TROUT

By J. B. Feilding, F.L.S., F.Z.S., &c.

Section I.—Historical

Many people are apt to look upon artificial fish-culture as a science of modern times just because it is only of late years that we, in our little island, have awakened to the fact that the inhabitants of the waters can be bred and reared just as well as the inhabitants of the fields. If, however, we look back as far as our early Roman writers in many places we come across statements relative to the domestication of both sea and fresh water fishes.

We are told also that the ancient Egyptians domesticated sea fishes to supply the luxurious tables of their richer classes. The Chinese, in many things the leaders of some of the most valuable inventions of everyday modern use, have, since European pre-historic times, collected the spawn of many of their indigenous fresh-water fishes and hatched them out in artificially constructed surroundings.

But all these early fish-culturists, as far as we can ascertain, never attempted the process of artificial fecundation, and from thence the complete cultivation of the fish from the egg to the adult creature.

It was not until the year 1749 that a German, named Stephen Ludwig Jacobi, gave to the scientific world the result of his careful experiments in the process of impregnating the ova of trout. This discovery was, unfortunately, not followed up in a practical way for several years after, when some French peasants took the matter up and demonstrated how various waters could be improved by the introduction of artificially bred fish.

The value of these demonstrations was soon noticed by the Government of their country, who assisted them financially. Later the now famous fish-cultural establishment at Hunungen near Bale, in Alsace, was erected, and in the year 1854 experiments were commenced. These investigations were superintended by Monsieur Coste. In England the first discoverer of the possibility of artificially impregnating the eggs of salmon was John Shaw, in the year 1837, while in America Dr. Thomas Garlick was, and is, recognised as the father of artificial fish-culture in that country. Garlick read of the experiments of Jacobi in 1853, and in 1854 he impregnated the eggs of the Eastern American brook trout, *Salvelinus fontinalis*.

Public funds were voted in America towards artificial fish-culture in Massachusetts in 1856, and it was in this year that the now famous Russian, Vrasski, discovered the present method of dry impregnation.

Frank Buckland, so often looked upon as the father of artificial fish-culture in England, then awakened fishery proprietors on this side of the Atlantic to their duty in keeping up the stock of fish, by his book called "Fish Hatching," in 1863. Frank Buckland's contemporary in America was Seth Green, who first attempted the general organisation of fish-breeding stations, and in 1870 the Deutscher Fisherie Verein was established, an organ of most powerful influence on the continent of Europe in fish-cultural matters. Many countries had been waking up to the necessity of regulating and improving their fisheries, and had established some form of Government department to attend to this vital matter. The following were perhaps the first:—Germany, France, the United States of America, Italy, Bohemia, Austria, Switzerland, Finland, Belgium, Holland, Russia, and Canada.

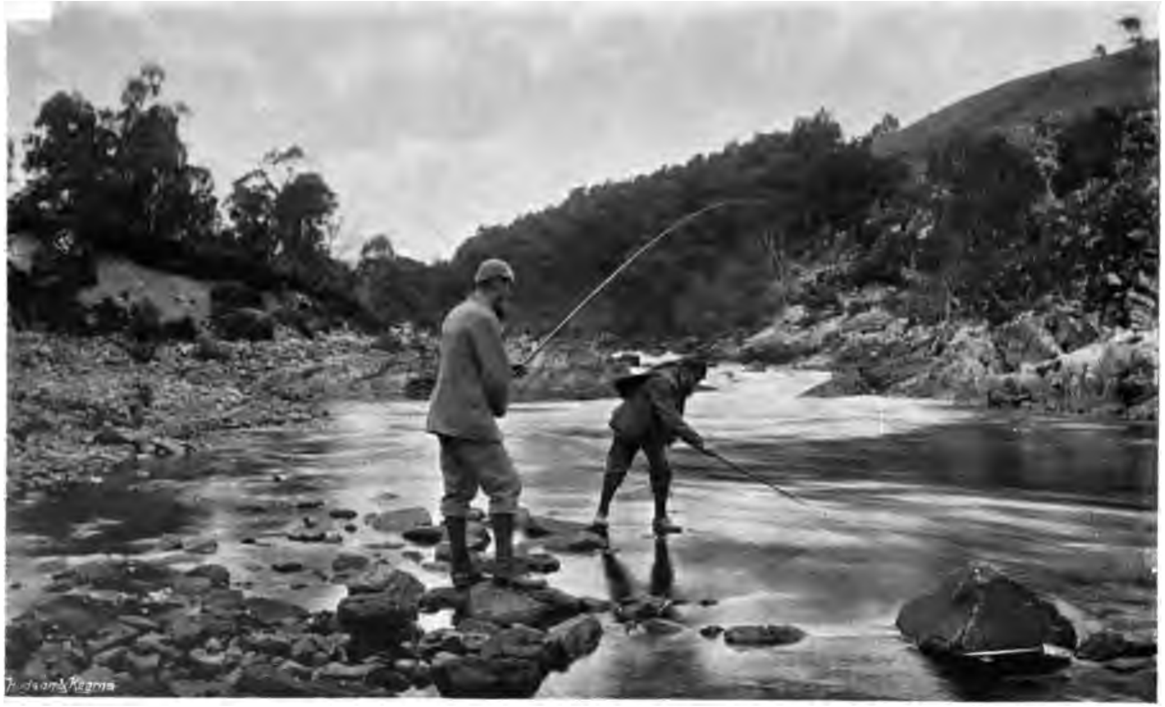
Contemporaneous with the formation of this German organisation was the American Fish-Cultural Association, which is now known as the American Fisheries Society, a most useful and influential society, to which belong all the leading fish-culturists of the United States, together with many European experts in the art.

Since these early times of fish-culture one country after another has taken up the matter in earnest, until we hear quite recently that the University of Tokyo in Japan has established a department for the study of economic aquatic biology. This then will show how much every country but our own has taken up this most important and, if I might say so, national subject.

SECTION II.—THE NATURAL REPRODUCTION OF THE ATLANTIC SALMON.

The life-history of the *Salmo salar* has been a problem from time immemorial. We have learnt much during the last century as to this fish's existence in fresh waters, but little, if anything, of its habits in its marine home. This much we know, that like all anadromous fishes, it is necessary for it to leave the sea and seek fresh water in order to reproduce its species.

Before describing the actual life-history of the fish it will be necessary to indicate its natural distribution in the world. As its local name implies the *Salmo salar* (Flem.) is, strictly speaking, an Atlantic fish. How far it travels north into Arctic region we cannot say, but this we know that it has



12—BROUGHT TO THE SHALLOW.

13.—BELOW THE FALL.

been caught in the icebound area of Hamilton Inlet, lat. 54° N., long. 60° W., in Labrador on the Western Hemisphere, whereas in the Eastern Hemisphere it appears, no doubt owing to the influence of the Gulf Stream, to travel as far north as Scandinavia, Iceland, and northern Russia.

On the European coast of the Atlantic the salmon is seldom seen to enter the rivers of the Bay of Biscay, while on the Western Atlantic coast early American history tells us that salmon were abundant in the river Hudson, though many zoologists doubt the fact owing to the historian not being a recognised naturalist. Suffice it to say, however, that on the American coast of the Atlantic this fish is seldom found south of the State of Maine.

It will be seen, therefore, that the Atlantic salmon, unlike the Pacific varieties, has a very small latitudinal distribution. Having indicated the fact that the Atlantic salmon is a fish inhabiting the south of the Arctic circle and northern latitude 43°, I will proceed to describe what is at present known of its habits.

In the autumn, during the latter end of September, the male and female salmon collect in the estuaries of rivers. Why they come to certain rivers in preference to others is a matter open to opinion, but I believe that a great deal depends on marine currents, for a fish in the gravid or "ripe" state will always face a strong current wherever it may be, and will follow it up until it reaches its point of origin. It is thus, I venture to suggest, that the larger salmon frequent the larger rivers for breeding purposes, combined, as I shall state hereafter, with certain chemical and geological surroundings. It must not be overlooked, at the same time, that the male fish when in this condition is extremely pugnacious, with a result that it will keep all its smaller compatriots out of range, driving them into smaller watersheds to seek other spawning beds.

It has been proved that salmon travel many hundreds of miles when at sea; but how far they venture into the deep waters of the ocean we, at present, are in ignorance.

The fish having collected together at the mouth of the river, await the first spate, they then penetrate up stream as far as they can, continuing pairing out as they travel. The female will then, when nearly exhausted, select a spot where the water is shallow, say from one foot to eighteen inches deep, with a gravelly bottom. Here, during the night for the most part, she will commence the operation of depositing her ova, though if not disturbed she will continue it throughout the day. The operation she goes through may be described in the following words:—

She throws herself slightly to one side with violent jerks, and with rapid lashing and fanning of her tail she will create a depression or hole in the gravel, while her mate usually lies slightly in front of her up stream, watching lest any intruder approach.

She continues this rapid action, alternately digging, depositing, and covering her ova until the whole process is complete and she has divested herself of the contents of her ovaries. Between the process of fanning the gravel and depositing the ova, the male fish drifts slightly down stream and changes place with her so as to impregnate the ova with his milt.

Fecundation being complete, the female drops down stream, while the male usually waits and hangs about the spawning bed for some considerable time after in order that he may protect the redd. He remains until he becomes exhausted, and then himself drops down stream, and becomes like the female what is usually called a kelt or unclean fish. It is then that, should they be unable to reach the sea quickly, disease is apt to attack them. They are weak in condition, usually with ravenous appetites, and therefore it is very desirable that every effort should be made to allow them to drop down stream as quickly as possible.

Now, to return to the redd, as the salmon nest is termed. It is evident that, being unprotected, it is open to the attack of all varieties of predatory fishes, mammals, and birds. Other fish, including salmon, come up or drop down from waters above, turn up the redd and devour the ova. Aged trout are particularly voracious, and will often devastate a series of redds in the neighbourhood in which they hunt.

Under ordinary natural conditions, with water passing over and through the redd, with a temperature usual to our rivers, eggs will hatch in about ninety days. To describe an unfertilised egg more minutely, it may be said to be spherical in form, semi-transparent, and about three-sixteenths of an inch in diameter. It is of an orange-red colour, chiefly on account of the oily globules which float inside the shell, otherwise it would be of a pale yellow tint. On fertilisation the ball of fluid inside the shell separates into two parts, one a flattened disc or protoplasmic germ, and the other or more bulky portion consists of the yolk upon which the embryo is built up. It is in this yolk that the oily globules float about suspended. The shell is very thin, but extremely tough, very difficult to break, and will often stand severe pressure amounting to some three or four pounds. It has been found that the female salmon will lay from 850 to 900 ova per pound of her own weight.

Now, these ova are extremely sensitive to the direct rays of the sun and disturbances of the gravel. Thus it will appear that under natural conditions they stand very little chance of hatching. It has been said by men of experience that only about five eggs per thousand deposited under natural circumstances, ever arrive at the period of hatching.

The varying stages that follow the egg are several in number, as follows:—On the egg hatching the creature that is produced is known as the "alevin," from the French word *alevin*, meaning young fry. During this stage the little creature is practically a helpless organism, subsisting entirely on the contents of its heavy umbilical sac attached between the pectoral and ventral fins. On the alevin absorbing into its system this nutriment, the sac disappears, and its skin is contracted up into the body. It is then called a "parr" or "samlet." During this period parr wander about in great shoals and become the easy prey of man and beast. From eighteen months to two years of age the fish assumes a silvery coat and is then called a "smolt," when it begins to drop down stream bit by bit making its way to the sea. The smolt remains at sea feeding on the fry of herrings, other fish, and crustacea, for a period of from six to eighteen months, when it usually becomes sexually mature, and returns to fresh water. Many fishermen and others dogmatically assert that salmon return to the river from whence they obtain their origin, but from the many scientific observations that have been taken I fear that it can only be termed a fallacy to make such an assertion. No doubt many fish do return to the identical river which gave them birth, but this rather from force of circumstances than from force of habit. I think I can venture to say that salmon approach the coast line as they are attaining maturity, in a gravid state, and will follow up the first fresh water current that attracts them, and my own opinion is, though open to many criticisms I am aware, that they do not venture when at sea beyond the fry-raising grounds of the herring and other like fishes, and these as a rule are not very far from the coast.

To return to the smolt; while at sea, I may say that most of its habits in these surroundings are mere conjectures, but we know that wherever it ventures it must be in the vicinity of abundant food, for when the fish returns to fresh water and is termed a grilse it has grown to an enormous size, and to all intents and purposes sexually mature, though its offspring as a rule does not prove to be so satisfactory as that of the adult salmon. The grilse on depositing its eggs, returns, as its parents did before it, to the sea, whence in the late spring or summer of the following year it returns an adult salmon often doubled in size.

Many persons assert that the salmon will only spawn alternate years, but as far as I have studied the question, I am of opinion that no fixed rule can be laid down. It is true that many do spawn biennially, and some even triennially, whereas a large quantity deposit their ova annually.

ARTIFICIAL CULTURE.

There are many systems by which the artificial cultivation of the migratory Salmonidæ are carried out; so in laying before my readers the following method I do not wish to appear dogmatic, but rather to give an outline of what may be called the general principles of fish culture as applied to the Atlantic salmon and migratory trout.

THE CATCHING UP OF FISH FOR ARTIFICIAL SPAWNING.

This operation may be set about in a number of different ways, but the simplest and cheapest is to commence by selecting a spot below some natural or artificial obstacle, such, for instance, as below a weir or waterfall. Care should be taken to select a spot low down the river in order that the largest and earliest fish may be obtained. It is in my opinion the best principle to prepare for the earliest eggs, for you would then have strong "fingerlings," or nine months' old fish, for "planting" while there is plenty of food in the river.

To return to the spawning station, as it is often called, it is necessary that a certain amount of apparatus be collected together. First of all it is important that a good drag net with purse in its centre should be obtained, a net of small mesh, say one inch in the bag or purse, and an inch and a half in the wings. Its depth will depend on the water, as will also its length. I prefer small mesh, because trout and salmon are not so likely to get hurt while being taken ashore as they would be if they got a fin or lower jaw through the mesh.

Now, besides this net with its necessary casting boat, four ripening cages should be obtained and anchored, if possible, in line across the river. Should, however, there not be room, anchor them in pairs some twenty yards apart up and down stream, but in such a position that all can be brought together when required. These ripening cages are made in a number of different ways; some are simply large cages of wood, so fixed as to float between two logs; others are made on the system of a floating nursery with perforated zinc sides; while the most ideal system to my mind is a large wooden crate with a float surrounding it, and lined inside, nine inches to a foot from the wooden bars, with string netting of one inch mesh stretched tightly top and bottom. By this latter means one is able to keep fish for a considerable time without "fungus," so often caused by an abrasion, particularly at this period of the year.

The process of netting the fish, which will always congregate at the foot of such an obstacle as before described, is simple, but should be conducted with great care, and only those accustomed to handle fish heavy in spawn should take the fish from the net. The net should (when containing fish) never be dragged on shore, but the fish-culturist in charge should wade out to meet the net in at least eighteen inches of water.

All fish taken from the net should be divided into four classes, namely, ripe males, ripe females, unripe males, and, lastly, unripe females. Only the largest and best formed fish should be selected. Fish deep in the "shoulder" and wide in the back are preferable.

To detect a ripe female quickly is an important matter on such an occasion, for no "trying" should be permitted. The simplest method is to hold her up by the tail and observe if there appears a small depression, caused by the dropping of the ovaria upwards and backwards behind the ventral fins.

If such occur it may be taken she will give her spawn freely.

A ripe male is more difficult to single out except to the eye of the expert who is in the constant habit of handling fish.

When filling the ripening cages it is wise to collect rather more males than females in the proportion of, say, seventy males to fifty females, not because it takes that number of males to impregnate the ova of fifty females, but because it will be found that a large number of males in certain years will not give up their milt freely, in which case it is no use wasting time over them. As a rule, however, one male, if he gives his milt properly, is sufficient to impregnate the ova of at least four, if not five, females.

SPAWNING.

Having now collected the number of fish you may require to produce a given quantity of eggs, basing your estimate on 850 eggs to every pound of female fish, you then proceed to tow your two cages containing "ripe" fish towards shore, or preferably, a suitable pier, from which the fish can be easily handled.

To describe the method of holding fish for the process of artificial fecundation would be, I fear, extremely difficult, and in most cases useless, for every one who tries his hand at it adopts his own system; but it should always be remembered that the head and tail must always be secure, the latter being the first to get a firm grip of.

With very large fish two persons will be required, one of whom stands behind the operator and secures the head, which is generally passed under the right arm. It is also in my opinion best to allow the fish to spawn as much as possible by its own effort without pressure, and this is best attained by drawing the caudal fin backwards or upwards from time to time and passing the hand gently along the abdomen.

Eggs should be always spawned into a clean dish, enamelled iron being best that has just the moment previously been taken from water of the same temperature that the fish has been "ripened" in.

Some persons go on spawning into the same dish until it is full, sandwiching in one male to every five females, but I think it is generally looked upon as preferable to only put the product of a single impregnation in a dish by itself. After or while the milt is being emitted on to the ova the contents of the dish should be gently stirred with a goose wing feather in order that the milt should get access to every ovum. When this is complete it is usual in many fish-breeding establishments to pour sufficient water into the dish to cover the ova and no more, then the dish with its contents is covered and set aside where it will not be disturbed for about half-an-hour, when impregnation will usually be complete.

Complete or perfect fecundation is shown by the ova being separate and no longer in a conglomerate mass, as they always are during the process of impregnation. If at the end of half-an-hour the ova show no signs of proper impregnation they should be washed by pouring water on them from a garden watering can and well rinsed, after which they should be freshly impregnated by another male. On the other hand, should the eggs be completely impregnated they can be poured into an enamelled bucket and placed under a tap or in running water for an hour, until they are thoroughly washed and clean, for it is very desirable that ova should be freed from all stale or surplus milt previous to being placed in the hatching tray.

HATCHING.

The process of spawning and fecundation being complete, there are two methods that can be adopted for dealing with the ova. First it will depend on whether it is your intention to plant as unfed fry, or rather alevins just coming on the feed, or to rear the fish by hand to a later stage.

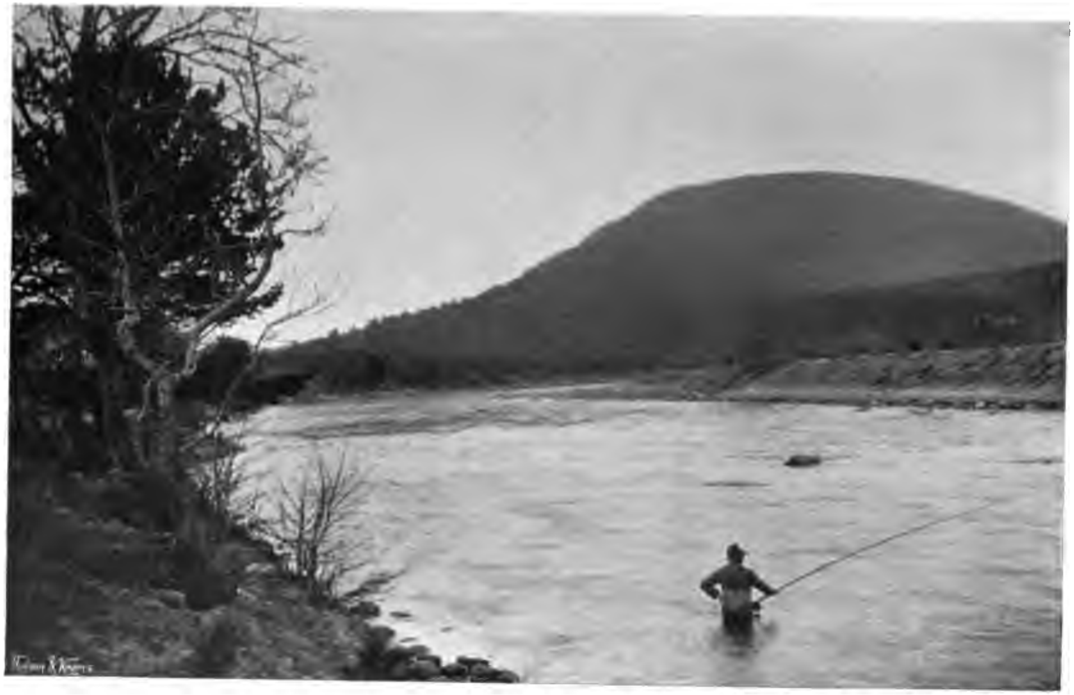
The former process being the simplest and cheapest is fast gaining ground in foreign countries, as a much larger bulk can be treated with the least amount of capital expenditure, and without the necessarily expensive expert attention.

To describe this system would entail the description of several forms of floating hatcheries and automatic fry planters in use, so I will not venture, but simply say that the eggs are placed in trays, which latter are fixed in a floating cage of fine perforated zinc, and when the alevins are seen to be on the feed the back of their temporary home is opened and they are at liberty to drop down stream.

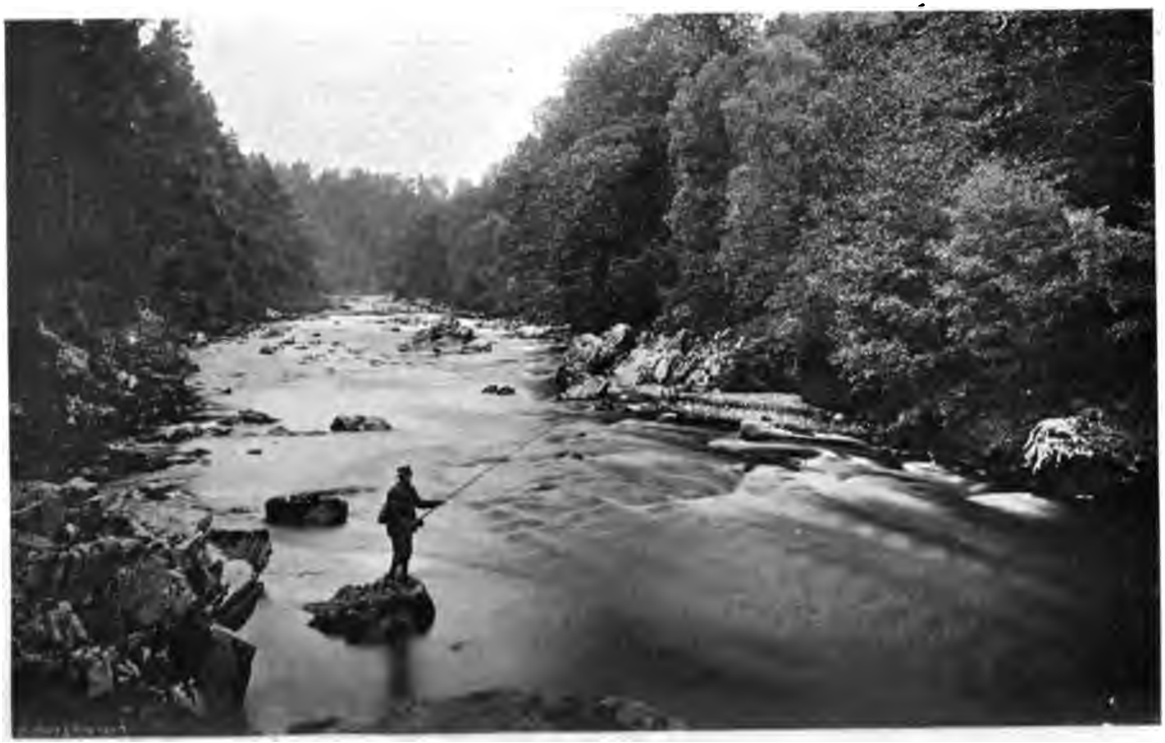
By adopting this system you are avoiding the majority of the natural risks of the river to which, should the eggs have been properly impregnated, they are constantly exposed.

Of the other systems of dealing with eggs, by far the least laborious is that of the covered hatchery with its many troughs. Here again I must ask, owing to the limited amount of space allotted me, to be excused from describing the several forms of hatching troughs, but suffice it to say that the simplest and most practical to my mind is the boat-shaped tray with wooden sides and perforated zinc bottom laid in a long narrow trough. A trough fifteen feet long should hold three trays four feet long, and have room as well for "dead water" boards at both inflow and outflow.

In arranging a hatching trough, however, it has been found to be best to allow the water to pass at the highest velocity possible without disturbing the eggs, and the main current should pass under, and not over, the eggs. I prefer this because oxygen will rise in the fresh water from the inflow, while carbonic acid in gaseous solution will fall from the ova and



14.—DEEP WADING.



15. A POST OF VANTAGE

be carried away. These precautions may be considered by many to be excessive, for, as I have proved to my own satisfaction, salmon eggs will hatch out on a damp piece of butter muslin on a plate in my dining-room, but let me explain at once that healthy stock is not to be obtained in this way.

By suffocating the embryo you must expect a large percentage of deformities such as short gill covers, &c., and generally debilitated offspring. So my principle is to adopt a system which is so necessary to the healthy state of the mammal, namely, give access to as much oxygen as possible and take away the carbon dioxide as fast as it is formed.

The next important matter is the consideration of temperature at which to incubate. This has been found to be best kept at 47° Fahr., though a variation of a degree one way or the other makes little or no difference; care, however, should be taken not to let it rise above 50° Fahr., otherwise you get within the dangerous area of too quick an incubation, resulting in weak stock. The period of incubation varies in the same ratio as the temperature, but a moderately long incubation is to be preferred to a short.

A question that often arises is whether it is a necessity to filter the water passing into the hatchery; for my own part I like clear water where there are eggs, but I have never found that the "hatch" has been much, if at all, influenced even when the eggs have not been seen for "cloudiness" in the water for several days. On the other hand, it much depends on what the matter held in suspension consists. Mineral deposit is, as far as I have seen, harmless, but organic matter, particularly if it contain domestic sewage, undoubtedly is extremely deleterious, for during the process of aërobic bacterial decomposition the ova are robbed of a certain quantity of the free oxygen.

Generally speaking, however, all that is necessary is to pass the water, before going into the hatchery, through a gravel and sand filter, for this will extract most things likely to become a trouble in the hatchery.

Now, to go back to the question of incubation and the handling of eggs, care must be taken to keep them in a subdued light, and out of the way of any direct rays of the sun; they must not be touched after the first twelve hours until they become "eyed." This "eyeing" period, as it is termed, is the period when the embryo first begins to become evident to the naked eye, and the eyes of the little unhatched fish stand out prominently under the shell like black beads. It is at this period that more rapid development commences and more aerated water is required, and, if possible, of greater velocity; and from this period on it is necessary to thin out the ova in the trays, leaving only what is deemed sufficient for the tray when the alevin stage is reached.

It is most important in salmon incubating, and especially rearing, that the alevins and fry should not be crowded; this I mean, of course, in proportion to trout. Most of the losses in the artificial cultivation of the Atlantic salmon, in many establishments, is due to the overlooking of this most important matter.

As soon as the embryos commence to throw off the egg shells, the latter should, at least twice a day, be taken out of the water, for they are often the cause of suffocation to the young alevin. Day by day a little more light should be admitted, provided it is diffused, and no direct rays of the sun should be permitted to reach them. At a week old, I am a believer in placing the alevins out in floating nurseries, where they will the sooner get acclimatised to water of more natural quality and surroundings, containing all the necessary microscopic food ready for them as soon as they so desire it.

Fry Raising.

If the floating nursery system be used, only some 10,000 fish, to be thinned down in a month to 5000, should be planted, and only then in about eighteen inches of water. Every morning before feeding a fresh cut sod should be washed out in the nursery to freshen it up. It will also have the beneficial effect of covering up any unconsumed food that may have dropped beyond the reach of the fish, and any accumulation of fæcal matter.

If trout be put in these nurseries they can be more crowded; in fact, double the quantity can be with safety introduced and reared without fear of harm coming to them.

The other system adopted for rearing fry is the feeding trough system. This usually means the emptying out of the alevins from the incubating trays into the hatching trough. By this means the fry only get such food as is given them by hand, unless special arrangements are made for the conducting of the natural river water without filtration into the troughs.

For my own part I prefer the first named or floating nursery system, with its more natural surroundings, and its accessibility to a constant supply of natural food.

The fry can, during their residence in the nursery, which should not exceed six weeks, have at least four feeds a day of finely chopped pig's or bullock's liver. The former is to be preferred to the latter, though there are besides these several very useful concentrated foods compounded and sold; but whatever is used care should be observed in selecting a food that contains no fats, and from 65 per cent. to 70 per cent. of soluble proteids. The whole system of fry feeding is one that requires a great deal of practice, otherwise a lot of fry will be lost, or fish of stunted growth will be the result. Fry are creatures that like food little and often, and, if possible, always within reach. It is of the greatest importance that the trough should be kept scrupulously clean, so that no fæcal matter would have time to decompose and become a centre for the propagation and dissemination of disease. The admixture from time to time of a little salt or permanganate of potash will tend to keep things as they ought to be; but, as in all other things, prevention of disease is better than cure, so it is advisable to permit the fish to live under as natural circumstances as possible, particularly bearing in mind the following points: natural temperature of the river or pools into which they will eventually be placed; chemical purity of water, that is, freedom from decomposing organic matter and toxic inorganic substances; space, in other words, avoiding any crowding in corners; and constant food supply throughout the day in order to prevent fighting and cannibalism.

As soon as all the fry in the trough or floating nursery are well on the feed it is wise to have them planted out into the ponds in which it is proposed to rear them to the "fingerling" or yearling stage, for the cramped surroundings of the former, however much ameliorated, cannot be natural to strong swimming fish full on the feed and able to look after themselves.

Now these fry-raising ponds should be so constructed as to be easily emptied at will at any time, and not deeper at the deepest point than four feet. I have found it best to construct them sixty feet long, three feet deep at one end and four at the other; twelve feet wide at the surface of the water is sufficient.

A good sun shade at each end is very necessary, composed of a floating hurdle covered with watercress. The flow of the water should be so regulated as to keep the temperature as near 58° Fahr. as possible; but great care should be taken to see that no fry get washed on to the screens and become so fatigued as to be unable to return to the pond.

When first planting out in the pond and for the first week very careful and constant feeding is necessary as the little fish will often starve from shyness in preference to coming to food in their new surroundings. It is best to have a girl feeding all day for the first few days, so as to try and coax the fish to take their food properly.

From time to time throughout the summer the pond should be carefully watched and sometimes netted, and any large fish removed and placed in another pond, for, as I have emphasised before, this thinning process is the all-important thing in successful salmon rearing. Early in the month of October sorting should commence, and all fish over five inches long should be put in ponds by themselves or else planted out in the river.

The larger fish, if still kept in domestication, should, if possible, be placed in square ponds with several inlets: this, with the object of keeping them well separated. Salmon, unlike trout, in the parr stage are very gregarious in habit; but every effort should be made to prevent this in domestication, for it tends to fighting and general crowding. In this form of pond these fish can be raised to the two-year-old stage, though constant sorting and thinning out will be from time to time necessary. Food can be decreased gradually in quality as well as quantity, two feeds a day being necessary after the fish attain six months of age.

The question of the quality of foods is very important if healthy brood stock in the future is aimed at, and all fatty substances should be carefully avoided. There are many foods on the market of good, bad, and indifferent quality, but whether feeding mammals or fish the same rules apply, namely, it is all-important to aim at getting a food suitable to the digestive organs of the creatures to be dealt with; in other words, do not think that a good food for a mammalian creature must of necessity be a good one for a fish. True, it may often not be harmful, but it cannot be made the same use of by the digestive organs as a food more especially adapted.

The young of the Salmonidæ in domestication will eat almost anything, just like the young of most other creatures, whether it is good for them or not; and often grow to an enormous size on foods very deleterious to their generative organs or general future welfare. Sheep's plucks, horse flesh, and greaves are all fatty substances of a nature quite unsuited to the digestive organs; while dog biscuits and other products of the like character are, comparatively speaking, of little use as a feeding stuff for fish, as the biscuits cannot be baked without a very large proportion of flour, which is practically useless. Such food as fresh or dried fish, if not of fatty species, are the best foods known, but all herrings, hake, and flat fish must be avoided, and cods' livers should be extracted before feeding with cod flesh. There are several forms of dried fish in use, imported from America and Germany and sold by the leading commercial fish-breeding establishments in this country; but fresh fish, if it can be obtained in sufficient bulk at a cheap enough rate—although the latter point is difficult to attain—is no doubt a very valuable food.

When feeding fish by hand, it is very necessary that the pond into which the food is to be thrown should be well stocked with both mollusca and crustacea—such, for instance, among the former, as *Limnea stagnalis* and *L. peregra;* and among the latter the fresh-water shrimp, *Gammarus pulex*—for they consume any waste food that may escape the observation of the fish, and also any fæcal or decomposing matter which will certainly form a centre from which disease might radiate.

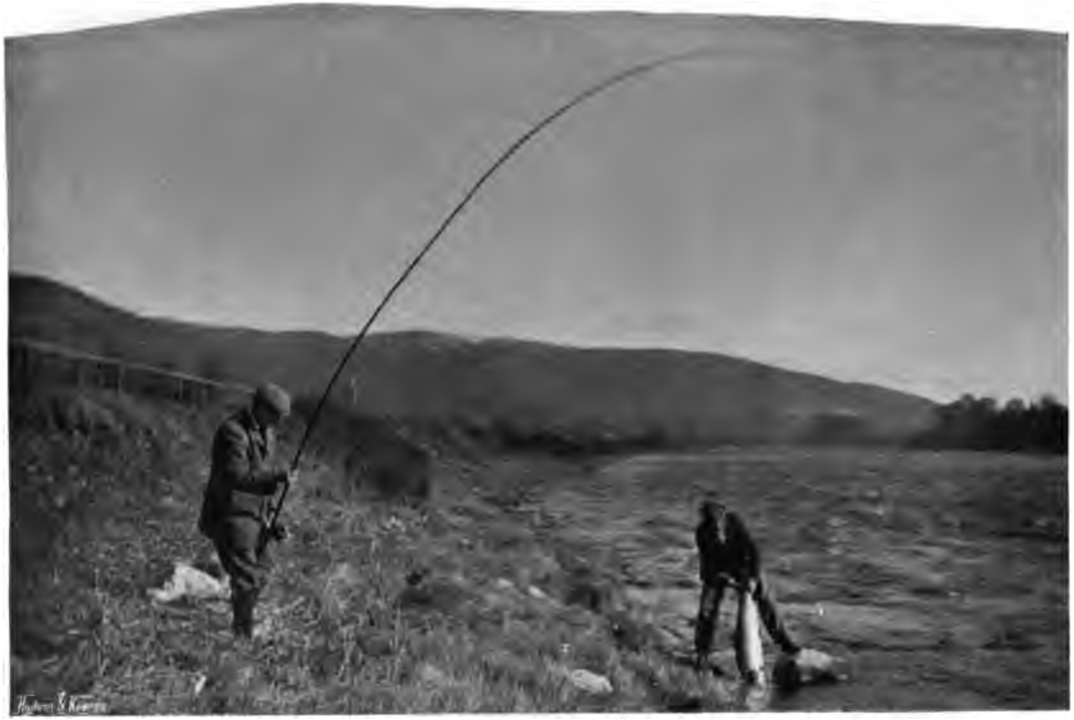
TRANSPORT AND PLANTING OF FISH.

Under this heading I propose dealing, so far as the very limited space at my disposal permits, with the best and cheapest methods of transporting and "planting" compatible with success. The question of transporting live fish is an important one; and they have to be specially prepared for the railway or road journey some days beforehand. It is best to take out such fish as are required for one "carrier" and place them in a tank, through which water is passing at a fair velocity, and there leave them without food for three or four days in order that they may have time to empty their intestines; it will then be safe to put them into the carrier, as they will not foul the water in which they have to travel. The carrier should be light, and such as can be easily handled by two men, say one and a half hundredweight at most when filled with water and fish. I consider this important because the quick handling of fish in transit is most essential, and men are not always at hand to help in handling the large carriers that are often used in this and other countries. Then the carrier should be so constructed as to keep up constant aeration during transit, and water of even temperature is necessary. A carrier of wood or wood covering is the best for keeping an even temperature, for the natural process of evaporation from the timber must of necessity—as in the case of the soldier's old water bottle—reduce, or at any rate maintain, a reasonable and healthy temperature in which fish can live with comfort.

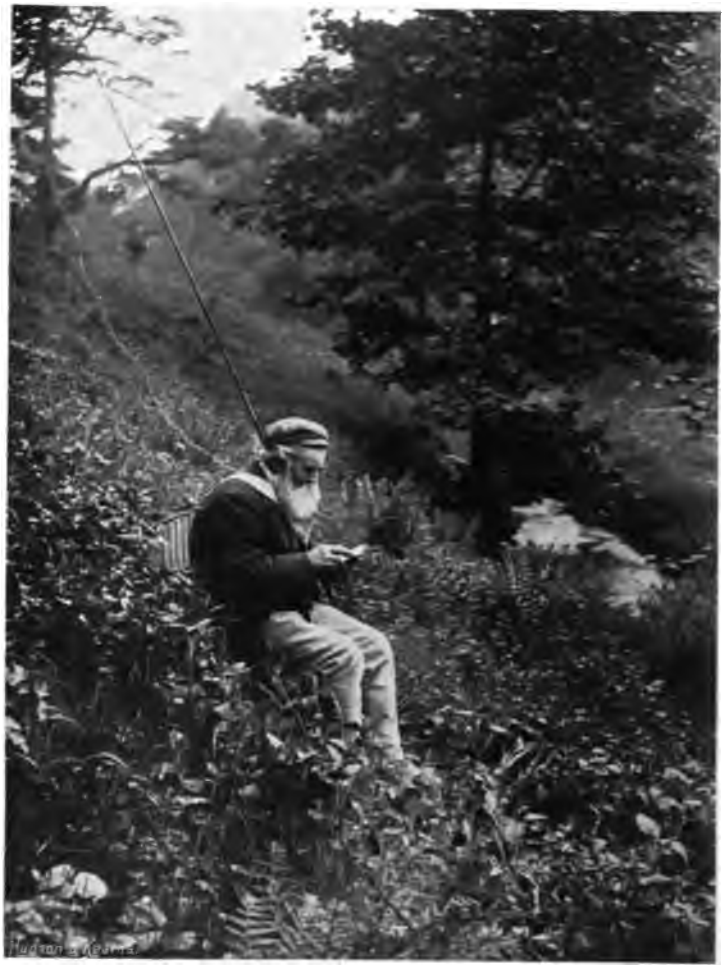
On arriving at their destination the temperature of the water in the carriers should be carefully taken, and that, also, of the river, and then the former should be *tempered gradually* to the temperature and quality of the latter, so that before the fish are liberated the water in the carrier should be practically the same as the water of the river.

The spots where it is intended to liberate the fish should be carefully selected some days before, bearing in mind the following points :—First, if it be salmon you intend "planting," they should be put down in small quantities, and thus minimise the risk of being caught by children and ignorant anglers, which is important with all fish of gregarious habit; on the other hand, if trout be planted, it does not matter, for they soon separate and select their own feeding-grounds.

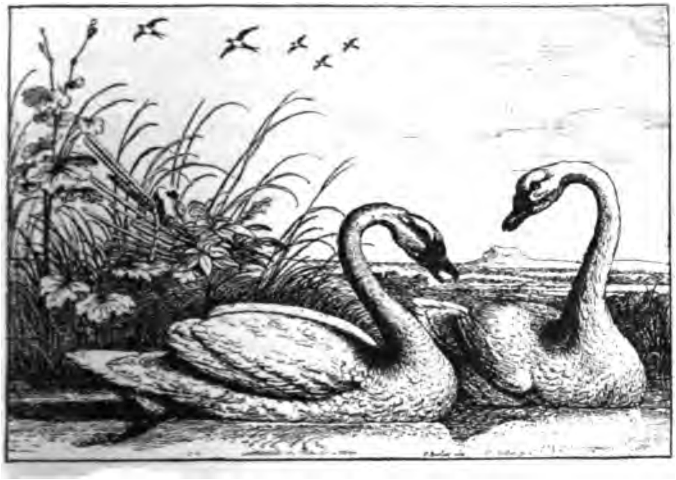
In both cases the places chosen should be as much as possible where there is plenty of natural food and shelter from vermin. Backwaters of two feet in depth are very suitable, and I prefer that, should it be salmon parr, or, say, fish of a year old, the backwaters be as near as possible to the point where the influence of the tide is felt, though above it, by, say, a mile. Hunting-grounds of herons and cormorants should, of course, be avoided.



16.—A GOODLY PRIZE.


Hudson & Kearns.

17.—"WHICH WILL HE TAKE?"



CHAPTER IV

SALMON FLIES

By John James Hardy

Salmon flies, lures, or whatever we may call them, have always afforded an interesting and inexhaustible field for discussion, speculation, invention, and not a little sentiment. One has a kindly feeling of "Auld acquaintance" when handling some study of colour in fur, feather, and tinsel, the association of which often carries the mind back to recollections of great days, which perchance began with disappointment and ended in satisfaction and content.

The river, after days of waiting, is at last in good volume and colour, and everything looks favourable for a grand day's sport as the rod is being put together and an eager start made. Salmon are rising all over the pool, which, however, is fished down three times with as many changes of colour, but without getting a single pull. Things seem very hopeless, when in dogged perseverance we put up that tattered and torn old "Jock," which brings us the best fish of the season on this seemingly hopeless day; or that ragged little "Dusty Miller" saves a blank by tempting a brace of "springers" to their destruction. The handling of these well-worn friends carries us back over the years that have been, brings to us again the smell of the pine-woods, the fascinations of the river, the wild beauty of the hills, and kindly thoughts of the friends we have fished with. There is a poetic fancy of feeling about these lures that does not pertain to a spinning bait of any description. We linger with fond fingers over the old flies, and are proud of the sport we have enjoyed when using them. It is so different with a beautiful Phantom or a deftly concocted spinning tackle. We do not speak so much about them, and we do not tell our friends how many fish of our last season's bag was due to their employment. There is really no need for any such feeling or sentiment, but there it is, and no one may deny it.

And yet, after all, what are these beautiful creations of fur, feather, and tinsel? They certainly are not "*flies*," although for ages this form has been called a "*fly*," presumably because its shape is the same as the artificial presentment of flies such as we use for trout and sea trout. The form here employed is reasonably like the natural insect, and up to the size employed as grilse flies may pass as such. When, however, we come to sizes 3/0 up to 7/0 this cannot be, as we have nothing in nature on salmon rivers which they may claim to represent, and therefore they clearly are not "flies," so that it would seem more appropriate to call them "lures." If one of these large "lures," with its gay colourings and Jungle Cock cheeks be drawn through the water, it assumes more than anything the shape of a small fish, and undoubtedly that is what salmon take it for. This may seem rank heresy to the purist fly fisher, who, while casting, fondly imagines he is "fly fishing," when in reality he is only pulling a "*lure*" through the stream.

Why do salmon take a fly? This is a question often asked, the more so as scientists tells us that *salmon do not feed in fresh water*—a statement which, however, cannot be accepted by anglers. This is not a scientific treatise on the subject, but we may fairly ask scientists, when we see salmon caught with worm, prawn, or minnow (which they often take into their gullets as a trout will do), what they are doing with them there? If this is not *primâ facie* evidence that they are feeding on them, and on this count the grand jury of scientists throw out the bill, there is little chance of getting a conviction against *Salmo salar* for "feeding in fresh water." That salmon are rarely caught with anything in their stomachs is quite true, but it may be that it is only the hungry fish which take a fly or a bait, and those whose stomach is empty. Or it may be that the salmon's power of ejecting food is so great that in the struggle to free himself he ejects everything in his stomach.

Well, then, why does he take a fly? Is it from curiosity? To a certain extent it may be, but to prove this is impossible; while the fact of catching him with natural baits, which he is attempting to swallow, is conclusive evidence that *he does feed in fresh water.* Those who have watched trout feeding know that they examine almost everything they see floating down stream, often taking and ejecting things which, from their smell and texture, they discover are not food.

A salmon, then, with his predatory instinct, may so take a salmon fly, because it arouses his curiosity as something strange to him, or as bearing a resemblance to some marine creature he has been accustomed to feed on in the sea, and conveying to his remembrance the luscious meals he made there. Whatever the reason of the taking, whether it be mere curiosity or for the purpose of an examination as to the suitability of the object for food, matters little to the angler, whose great object is attained so long as he can induce the fish to take. And it is in this direction that careful study and experience will often save a blank day. The amount of light and shade, the character of the day, the force of the wind, the size and state of the water, and the general conditions obtaining during his fishing are well worth careful thought. What size of fly should be used to suit the height of the water? What colour to suit the light and condition, and what depth to fish, are all important. The size of the fly to be used appears to be affected by the temperature, as well as the height of the river and the brightness of the day. When the temperature is very low, as in snow-fed rivers in early spring, a very large fly is requisite, whereas later in the season when the temperature is higher a much less fly must be used. Then in reference to colour. It is generally held that a bright fly for a bright day and a sober fly for a dull day are necessary, but we have seen this theory upset on many occasions. As the light begins to fade a larger fly should be used. It is a common practice to put up a white wing of some kind for the evening, but we have seen a large "Gordon" do best on many occasions, and this fly in its general colour effect is dark.

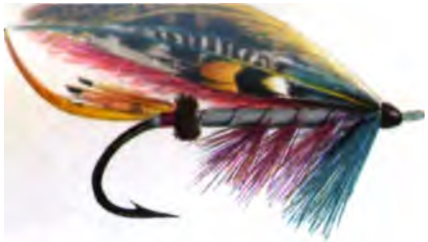
What the effect of colour is on the fish we have no means of knowing further than from the teachings of our experience. Some maintain that all colours are alike, and as viewed against the sun, this is largely true, although the transparency of many of the materials used in salmon flies must have an effect by transmitting a portion of light through them, and so giving translucent colour effect. On the other hand, viewed with the sun, colour to us is distinct and clear, but is it so to the fish? It may, we think, be assumed that it is, and that salmon can distinguish colour. We do know that trout can, and if trout why not salmon?

The question of particular colours for particular rivers has doubtless something in it, as the colours which are mainly responsible for the most fish are those which the experience of those who fish these rivers has proved in practice to be the best.

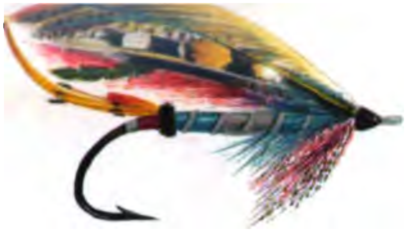
In choosing a fly we may with advantage consider the depth of the pool and the background against which the fish sees the fly. From one side of the river this may be a clear sky, while from the other it may be a dark pine wood, or a sombre overhanging cliff, each condition requiring a very different colour of fly. We must also consider the position from which fish lying on the bottom see the fly. Deep pools of, say, eight to ten feet naturally require a full-sized fly, in which the body should be the predominant feature. Shallower pools where the fish see the fly more from the side require a wing effect.

The eye of the fish being placed at an angle with the stream commands from either side a fair range, but, as he generally lies against a stone, he is unable to see a fly presented from that side, and, if he refuses to take, he should, if possible, be fished from the other side of the pool.

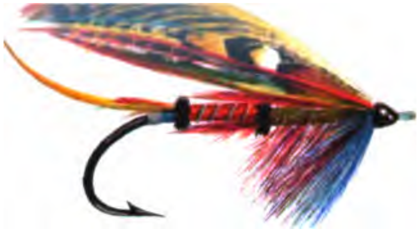
The enormous variety of salmon fly patterns (some four hundred), many of which vary so little, inclines



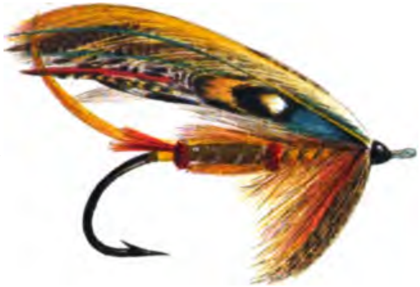
Nº 1 *Silver*



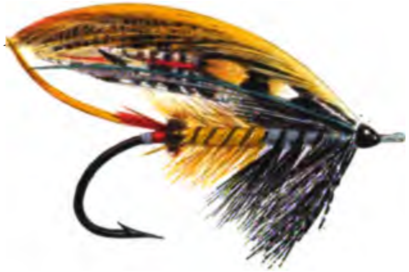
Nº 2 *Blue*



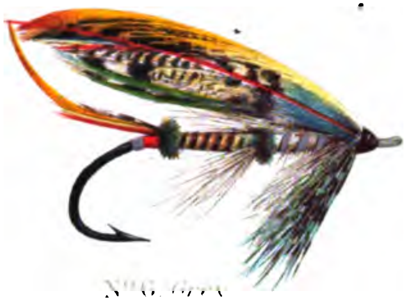
Nº 3. *Red*



Nº 4 *Gold*



Nº 5 *Black*



Nº 6. *Grey*

PLATE 18.

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one to think that they cannot all be necessary or even desirable, and only lead to confusion, and that it might be desirable to group the predominating colours into, say, six representative flies, which will fairly well cover all that can be required. With this object in view, six typical flies (which have all been proved good killers) have been arranged for this work, and are illustrated in colour for the guidance of dressers. They are numbered consecutively, one to six on Plate 18.

No. 1, "Silver," embraces in its general effect flies such as Wilkinson, Silver Doctor, Murdoch, Silver Grey, Candlestickmaker, &c.

No. 2, "Blue," in the same way represents Spring Blue, Greenwell, Blue Jay, Benchill, Blue Wasp, &c.

No. 3, "Red." Gordon, Durham Ranger, Red Rover, &c.

No. 4, "Gold." Torish, Goldfinch, Yellow Wasp.

No. 5, "Black." Jock Scott, Black Ranger, Black Doctor, &c.

No. 6, "Grey." Grey Monkey, Grey Heron, Lemon Grey, Claret Grey, &c.

The Nos. 1 and 2 are best for high water, and should therefore be dressed in the larger sizes. Nos. 3 and 4 are more suitable for a medium water, while the Nos. 5 and 6 are particularly suited for clear water.

In making a few observations relative to these flies, it is not intended to convey to the reader that the different numbers are only suitable for the conditions mentioned. The remarks are intended to be taken merely as a general guide, as, for instance, the Nos. 1 and 2 dressed small, and used in the correct sizes, are particularly suitable for a bright day in a small rough water, and so on.

CHAPTER V

SALMON FISHING: HOOKS AND KNOTS

By John James Hardy

The practice of angling with a hook, or hooking with an angle, dates back as far as prehistoric man, and we have evidence from the caves in many parts of Britain that, during the Palæolithic period man used rude flint hooks for the capture of fish. Since that time he has devoted much of his inventive skill to the improvement in material, strength, and shape of the hooks to be employed in fishing.

When we consider the important part the hook plays, and that all our labour is lost if it does not perform its part in a satisfactory manner, we are led to a full appreciation of the necessity of employing only the very best which the age affords, and this is a subject so important and interesting that we propose to give a short account of the manufacture.

The wire from which hooks are made is generally round, but lately a patent has been granted for an "oval" wire. The wire is received from the rolling mills in large round bundles. It is then put into a machine which straightens it and at the same time cuts it into the required lengths for the hooks.

These pieces are then taken by the workman and barbed by cutting into them with what is called a bearding knife, which throws up the barb or beard. This barb is then filed into proper shape, and pointed, several peculiar shaped files being used to accomplish this.

The opposite end to the barbed one is now filed down to the proper taper, and forms the shank. This is done by holding the wire in a pair of pinchers in the left hand, and rotating it, while filing with the right.

The wire is now ready for bending into the shape of a hook, which is done by help of a piece of wood held in the left hand of the workman, into which (wood) pieces of steel have been fixed. The wire is passed between these, and by a twist of the left hand, simultaneously with a turn of the right, it is bent into the required shape, and removed. It is now ready for hardening, and to do this a quantity of hooks are placed in a pan, which is then heated to a bright red. The hooks are then dropped into a large pan of special oil and cooled; this renders them hard and brittle, so that now they require to be tempered, *i.e.* toughened, and in order to do this the hooks are first rough-polished to remove the grease and dirt from them, to enable the change of colour to be seen by the operator as heat is again applied to them. The tempering is done by placing the hardened hooks in hot sand or emery, where they are kept on the move by a skilled mechanic, who knows from their peculiar colour when they are correctly tempered. After this the hooks are polished in revolving cylinders in which sand or emery is placed with them. The finishing process is to Japan, blue, or rust-proof them as required, when they are ready for market.

In treating hooks in large quantities it is naturally impossible that all and every hook should be perfect, and therefore they are sorted by the maker before he sends them out. It is further necessary, before the hook is accepted as perfect, for the salmon fly dresser to test it for sharpness and strength. This, of course, can only be done in a high-class trade, and not where hooks are dressed by the gross for export or ordinary shop sale by general dealers throughout the country.

The variety of shapes employed is very great, but the chief are the "Limerick," "round," and "sneck" bends, the "Limerick" being mostly used for large flies, the "round" for bait hooks, and the "sneck" for small flies.

The question of shape is very important, as also is the relative proportion of length of shank to width of bend. This varies very considerably, there being no recognised standard, each maker following his own ideas in this respect, guided by the demands of his customers, whose opinions differ in each district.

The usual proportion of bend to length in Limerick hooks, when larger than 5/0, is in our opinion too great, and makes too heavy a hook. In districts where in early spring very large flies are used, it has been found necessary to greatly reduce this, and so we have what are called "Dee" irons, that is, hooks, say, 5/0 bend, 7/0 length, and so on. These hooks seem quite wide enough in the bend, and it becomes a question as to whether, generally speaking, hooks of the usual Limerick pattern are not too wide in the bend for their length. Hooks of shallower bend have been tested in salmon fishing for some years, and are found to give greater satisfaction in hooking, while they assist greatly in forming a better shaped fly.

The introduction of the "oval" wire, as shown in section, at once exposes what has been a glaring evil in round wire hooks. Most anglers who have fished much for salmon will have had experience of the breaking of a barb at a critical time, and the consequent loss of the fish.

The claim for improvement in the "oval" wire hooks is "that they are stronger, as the stress being received on the greater axis of the wire, is better resisted. The barb neck is stronger, as the cutting up of the beard leaves a greater depth of material than in the round, and therefore the strength is greatly increased at this important part. They are also better in proportion of length of shank to bend, and the points are better placed than in ordinary Limerick hooks."

The first and most important function of a hook is that, when taken into the mouth of a fish, it shall *lay hold.* In all hooks there is a certain amount of spring when pulled. This spring varies according to the openness of the bend and the thickness of the wire in proportion to the length of the shank. All this enters into the question of the deflection of the point after it has laid hold of the fish's mouth, and determines whether, on pulling the gut attached to the end of the shank, the hook will drive through a hard substance (in which case it requires a fair amount of rigidity in the bend), or whether the inclination of its point is to cut its way out parallel to the line of pull or to drive in deeper at an angle to it.

In order to ensure the first proposition, that the hook shall *lay hold*, it is necessary that the point shall be at least parallel to the line of the shank, and it is better if it projects beyond it slightly, so that the first thing to touch will be the point, and yet, take any of your salmon fly hooks and place the shank parallel to the top of a table, and note where the point is! You will probably find it as shown in the illustration No. 1, which is undoubtedly wrong. That shown as Fig. 2 is vastly superior in this respect, and would probably account for a fish No. 1 would miss.

Then as to deflection. The length of the shank is here very important, as it is from the end of the shank that the gut line gives the pull to the hook; and the longer the shank, and consequently the narrower the proportionate bend, the more directly will this pull come in line with the point, and may cause a hook like Fig. 1 to cut its way out. What is required is that the proportion of length and bend, considered in relation to the inclination and first position of the point, shall be such that a pull from the end of the shank shall cause the point to take a hold, and that further pulling shall cause it to drive in, and so take a deeper hold. But herein we have a difficulty, inasmuch as if the point strike into a fleshy part, it will not deflect so much as if it strike into a harder place, where it meets a greater resistance, particularly on a bone; and thus it is difficult, when one considers the amount of spring, to determine the perfect length. A round wire (Fig. 3) will spring much more than an "oval" one (Fig. 4), so that the oval enables us to more correctly form an ideal hook, as we have less calculation to make for this spring. In the "oval" wire hooks all this has been determined by actual tests with a salmon rod, both on the bony and fleshy parts of a fish's mouth, in order to get as perfect a proportion as possible.

In fishing, the rod point is, say, one to two feet from the surface of the water, and the fly 25

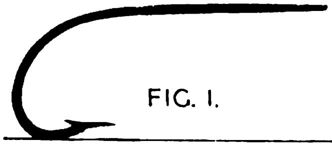


FIG. 1.

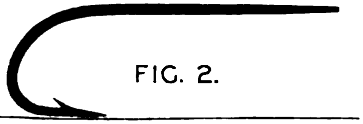


FIG. 2.

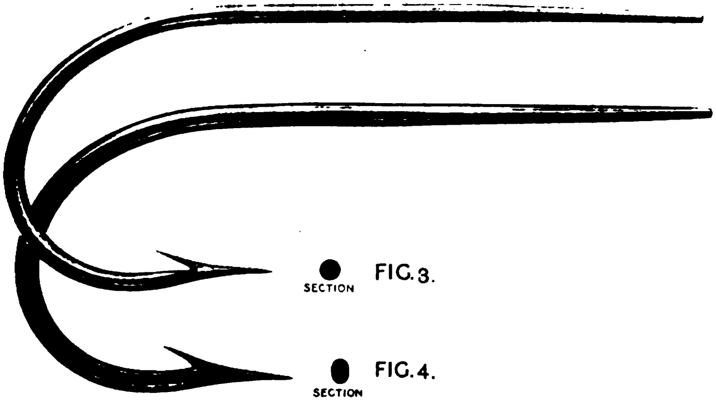


FIG. 3.

FIG. 4.

TYPES OF HOOKS.

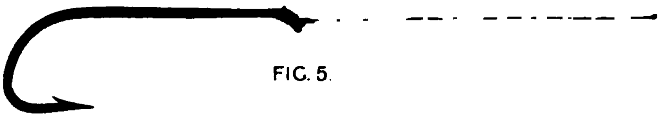


FIG. 5.

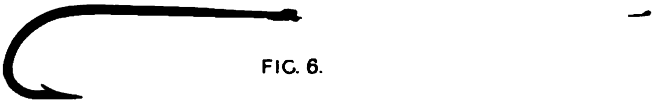


FIG. 6.

STEEL-EYED HOOKS.

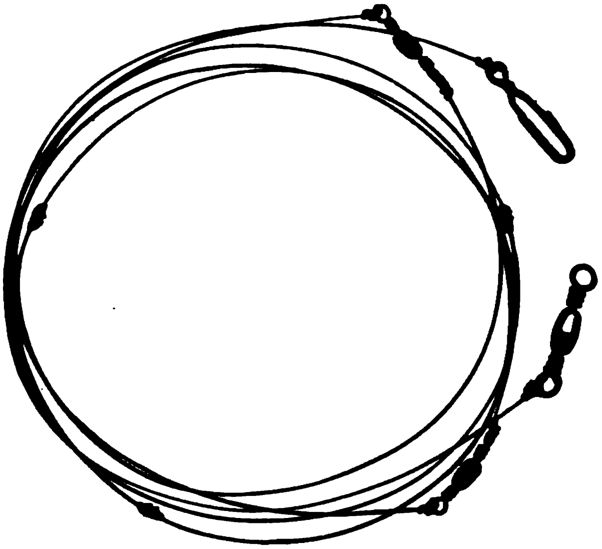


FIG. 7.

GUT TRACE AND SWIVELS (see p. 140).

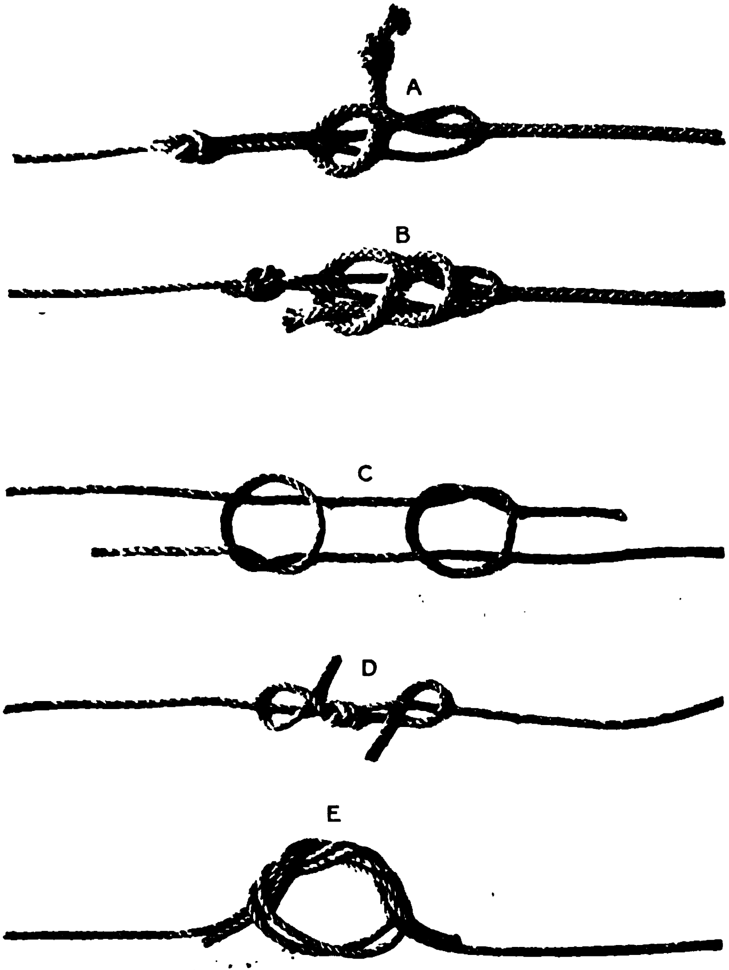
yards from you, so that the pull is almost directly in line with the shank of the hook. If a direct line be carried from the rod's point to the end of the shank of the hook and another to the point of it, the two would only vary about half an inch, and therefore if the point be parallel with the shank, the pull is almost directly on it, and this clearly shows that the point should at least be deflected a little.

The question of gut loops versus metal eyes is by no means so important in salmon fly hooks as it is in trout fly hooks. To the dry-fly fisher the introduction of the metal eye, both upturn and downturn, has been a perfect godsend, but in the salmon fly the advantage is questionable. We are old-fashioned enough to prefer the twisted gut loop, which, if of proper size and thickness, will outlast the fly. Personally we have seldom seen this detail of a fly fail if reasonably used. The tinsel will get cut, and come undone, so will the hackles and wing feathers, when a fly has been in contact with the sharp teeth of a few fish, but this would happen equally with either a steel eye or a gut one. What, then, is the advantage of the metal eye over the gut? It wears longer (that is, the eye, not the fly). Therein is the sole claim to any advantage. On the other hand, the fly is not so neat at the head, and in the case of a turn-down eye in fairly large flies the effect is well—not pleasing. To salmon fishers, who have given close thought and attention to the art of building up a fly, and who believe in the head being as small and fine as possible to, as it were, *sneak* through the water when crossing a current, this square turned-down metal eye, when tied with a gut knot, is objectionable, as without doubt it causes the fly to skirt and wobble. It is true that many men kill fish with flies dressed on them, but that does not prove that with better arranged flies they would not have killed more fish. It would seem quite probable that they would. If a salmon fly is to have a metal eye, why in the name of common sense that eye should not approach as nearly as possible the usual gut eye is a mystery.

It is, however, possible to obtain hooks as shown in Fig. 5, both single and double, and the illustration conveys the idea of this new hook in all detail. The slight turn up of the eye (which is made only sufficiently large barely to admit two strands of salmon gut) is to permit the end of the gut to pass under the main strand in finishing the figure of eight knot, and allow it to come in direct line with the shank. These flies can be tied on in the same way as an ordinary gut-looped fly, and assume exactly the same form and position in fishing, so that those who prefer metal eyes to gut ones can now indulge their fancy without destroying the shape or movement of the fly in work.

The illustration of these two shapes as given in Figs. 5 and 6 will make the argument more clearly understood.

The question as to whether single or double-



19.—*SIMPLE KNOTS.*

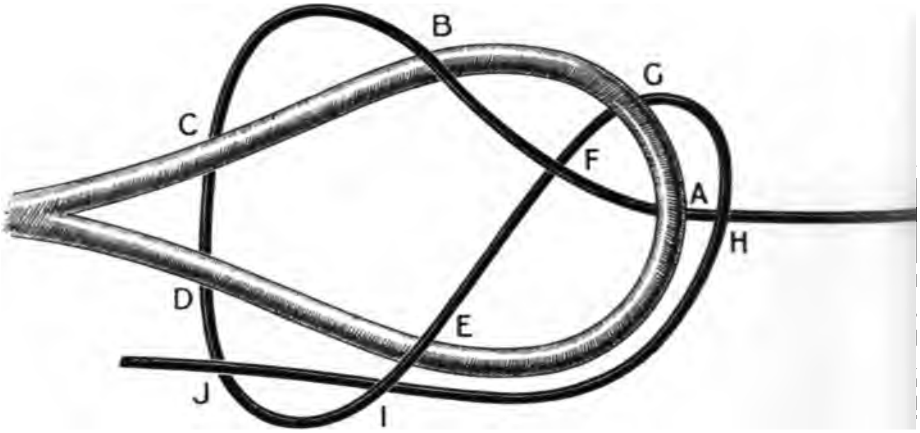
Fig. A is a simple method of attaching a gut cast to the reel line. The end of the line is passed through the gut loop, round it, and then under itself.

Fig. B is another method which has this advantage, that the loose end points towards the fly It is a further development of A—the reel line being carried over itself and under the first formed loop. It is really a figure of eight-knot and may be employed to tie on a salmon fly.

Fig. C, a simple method of attaching two pieces of gut by two single knots.

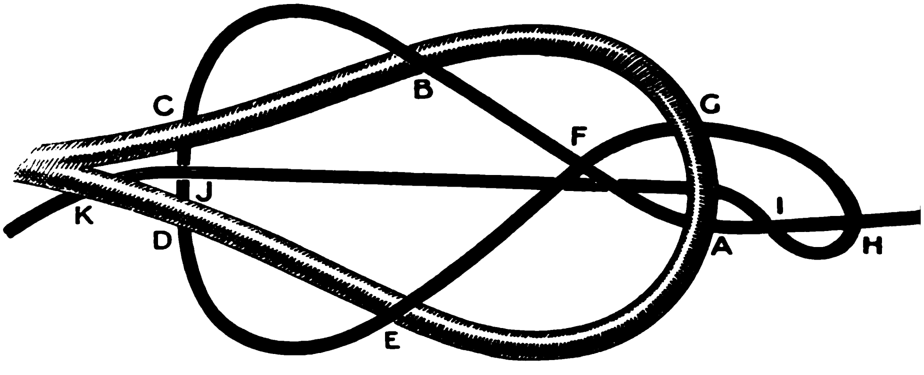
Fig. D shows the knots drawn tight together and the half hitch formed to fasten down the ends, which are then cut close off.

Fig. E another simple method of attaching two pieces of gut. The ends are laid together and a single loop made, when the ends are passed through twice, pulled tight, and the loose ends cut off.



1st Method.

Pass the gut through the eye from the underside at A—over at B—round under at C and D—over at E—under at F and G-over at A H through at I to J. Then pull tight, leaving an eighth-of-an-inch over at the end.



2nd Method.

Pass gut through eye from underneath at A—over B-round C and D over at E and F under G round H to I. Now turn the fly up and pass end under at J to K and draw taut, leaving an eighth-of-an-inch at end.

20—METHODS OF ATTACHING SALMON FLIES TO GUT.

hooked flies are best is difficult to solve, as after all our opinion can only be an hypothesis. We do not see the fish turn with the fly, nor will all fish turn in the same way. We once lost a great fish in Norway when using a large double hook. On this occasion he evidently got his nose against a rock, and one hook projecting got caught, and so, using it as a lever, he wrenched himself free of the other, which when recovered was much bent. Of course if the fly had been entirely in his mouth he could not have done this, and one may say that on this occasion it is also probable that had one been using a single hook he would not have been hooked at all. Small and medium salmon flies, say Nos. 8 to 1, are, we think, better double, and this may be carried up in the larger sizes to 3/0 if preferred, but beyond that they get heavy, and are difficult to cast. The angle at which double hooks are placed to each other is important, sixty degrees being the best. If it be greater the hook, as viewed across, narrows too much in the bend, and is not so likely to hook a fish.

Every angler should be able to mend his own casts and to tie on his own flies. Your ghillie will do this for you, but we prefer not to leave such an important matter to the ghillie. There are many methods of tying on salmon flies and knotting gut together, and an illustration of one or two may be useful.

To tie on a salmon fly the figure 8 is the best we know, and having found it always firm, safe, and neat, we cannot do better than recommend its constant use. We give two methods, the first of which we always employ for flies with gut loops. The second is better when using steel-eyed hooks of the improved type.

21.—LUNCH BY THE RIVER.

22 OUT INTO THE STREAM

CHAPTER VI

ON THE MAKE AND CHOICE OF SALMON RODS, REELS, &c.

By John James Hardy

Before attempting to proffer a few simple hints on the use of the rod, it would seem desirable to give a short description of the improvements which have taken place within the last thirty years or so. In doing this it will be necessary to go over some ground, most of which will be familiar to those who have lived through a decade or so of development, and have probably tried most of the different types brought forward from time to time. They will not, we hope, be wearied with the repetition, but, with a generosity ever present in the angling fraternity, gladly suffer a little on account of their younger brethren, to whom these notes are more particularly directed.

At this point the writer takes leave to say that he in no way desires to dogmatise, or in any way presumes to dictate to the host of skilful anglers, many of whom are probably better qualified to instruct than he is. The ideas and conclusions herein stated, however, are the result of many years' experience in England, Scotland, Ireland, and Norway, in all branches of the craft, aided by many failures and the lessons derived therefrom, and if any of the information given should prove useful and instructive to others the writer will be amply repaid for his trouble.

It will be nothing to the purpose to go back to Dame Juliana Berners in her "Fysshynge wyth an angle," as described in the "Booke of St. Albans," A.D. 1486, but it will be sufficient to draw some sort of comparison between rods of the present day and those of the past generation, many of which are still in existence. Indeed, it is no strange thing occasionally to meet an angler armed with a rod he can boast of as having been used by his grandfather. The rods of the past generation, however, were really very primitive weapons (so far as manufacture is concerned), the material used being ash, hickory, or greenheart, rounded off, and fitted together with spliced or ferruled joints. Their prototypes may still be seen where some skilled angling mechanic is lucky enough to get some well-seasoned material, and purchases from the local tackle-maker ferrules and fittings, and so makes himself a rod.

The earliest form of joint was doubtless the "splice," which has died hard. Even at the present day there still exist a few conservative anglers of the old school who prefer their rods so made. The sole advantage, however, which may be claimed for the "splice" is that it is light. People are apt to imagine that it gives a more perfect curve and action to the rod, but this is a fallacy, and arises from the idea conveyed to the mind by a splice in section, being two half-circles at the centre, tapering off at either end to nothing. But a splice so made is useless for a rod, which, as a matter of fact, must be largely oval, and this creates throughout its length a stiffness out of sympathy with the true taper of the rod. Another objection to it is that it does not work equally, *i.e.* if a rod be used for casting in a line with the edges of the splice and then held in a position at right angles to this, the action will be found to be different, *i.e.* stiffer when the rod is used across the longer axis of the oval and more supple when used across the shorter. If we add to this its great inconvenience and trouble in fastening, and the fact that well-ferruled rods can be purchased as cheaply, we have said enough to bury decently the friend of our boyhood.

The present form of ferruled joints, where the ferrule is of proper gauge and tempered to spring in unison with the rod, seems almost final. There are many patented arrangements for holding the ferrules together, called "lockfast" joints, &c., and their simplicity, strength, and ease in manipulation leave little or nothing to be desired on that score, while the improved method of connecting them to the rod by what are called "splint ends" makes a very perfect and sound connection. In fittings for holding the reel nothing can be simpler than that called the "Universal," which is merely the application of two wedge-shaped holders—one being fixed for pushing one end of the reel plate into, and the other loose in the form of a ring which is drawn down over the other end until it holds firmly.

The materials used for the construction of salmon rods embrace some of the toughest and most elastic woods known, together with a variety of bamboos. These woods are generally used in the solid form rounded, while the bamboos are split up and built together again in varying sections, according to the quality of the work desired.

In woods so used, the pieces are cut or rent from the sawn plank, and as it is quite impossible to cut continuously with the fibre, there is always a liability to split from the surface in line with the grain, which of necessity runs, at the best, obliquely across its axis. No rod-maker can, however much he may test work in progress, be justified in saying what such a rod will stand. Depending as it does for the adherence of its parts on its natural sap and structure, which, while perfect in the whole tree in its continuity of fibre, has been much destroyed by cutting

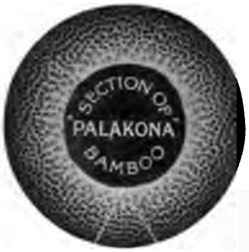


Fig. 8.
SECTION OF BAMBOO.

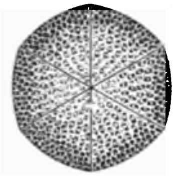


Fig. 9.
SINGLE BUILT.

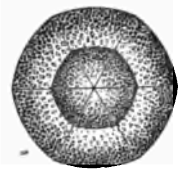


Fig. 10.
DOUBLE BUILT.

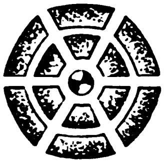


Fig. 11.
DOUBLE-BUILT STEEL CENTRE BEFORE CEMENTING.

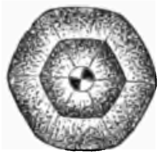


Fig. 11.
DOUBLE-BUILT STEEL CENTRE AFTER CEMENTING.

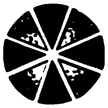


Fig. 12.
SINGLE-BUILT OCTAGONAL BEFORE CEMENTING.

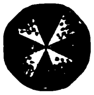


Fig. 12.
SINGLE-BUILT OCTAGONAL AFTER CEMENTING.

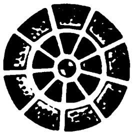


Fig. 13.
DOUBLE-BUILT STEEL CENTRE NONAGONAL BEFORE CEMENTING.

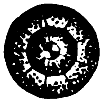


Fig. 13.
DOUBLE-BUILT STEEL CENTRE NONAGONAL AFTER CEMENTING.

SECTIONS OF RODS.

and tapering, so that its durability must always remain an unknown quantity.

In using bamboo, however, the case is vastly different, as the culms are split and cemented together again, thus preserving the continuity of fibre and structure in their entirety. To effect this, no part of the skin, which is the hardest and most valuable part of the material, should be removed, and it is here that the great skill of the rod-maker is apparent to the expert. Bamboos are composed of a series of cells with strong walls. These cells, large in the inner part called the pith, are reduced in size and multiplied in number as the outer walls are reached, where they are closed round by a hard enamel-like skin. (See Fig. 8, page 94.)

Bamboos, of which there are over 150 known varieties, grow in most parts of the East, and, as is the case with other grasses, the stem is more or less hollow, with transverse solid parts, called joints or nodes, from which the leaf grows. In different species the length between the joints or nodes varies greatly, as also does the density and strength of the fibre, depending largely on the particular nature of the soil and climate where it is grown, so that it must not be assumed that all bamboos of any particular kind are of equal value, nor even that all are suitable for fishing-rod making. There are particular districts, however, which manufacturers have discovered produce the finest and toughest culms; but this knowledge, which has only been obtained after great expense and many years of research, is naturally guarded very jealously.

Although these plants grow in such vast quantities, it is very difficult indeed to procure bamboos of a quality to satisfy the scruples of the manufacturer who has a reputation to preserve.

Plants of *Dendrocalamus strictus*, the bamboo commonly, although not exclusively, used for rod-building, are called by the trade "Calcutta rods," and are described as male and female. The so-called male is much thicker in the walls than the female, and is largely used for lance-shafts, for which it is very suitable. The female, however, is finer in the cell-structures, and contains more of the siliceous matter in the tissues, and is therefore more suitable for rod-building.

This distinction of "male and female," however, is an error, and only indicates the strength and thickness of the culms. The plant has hermaphrodite flowers like most other grasses.

These bamboos are frequently crooked, and green or yellowish-green in colour, according to their ripeness, which varies with their position in the clump, those on the outside being more yellow and riper, by getting more sun than those in the interior, which are more shaded. In order to straighten and prepare them for market, the natives make a fire of leaves, grasses, &c., and then lay them in this until they are soft enough to straighten. While this firing doubtless solidifies the sap and hardens the cells greatly, it at the same time destroys 75 per cent. of the bamboos for rod-making by burning through parts of the outer skin, of which the effects may be seen in the very dark blotches. Where this appears the material is worthless, as all the original structure has been destroyed. It has been very difficult to persuade the natives to adopt special methods of heating for the purpose of straightening, in order to avoid this over-burning; but it is satisfactory to know that better methods, under strict supervision, are now being employed. As the leaf base on both sides of a bamboo covers fully one-third of the circumference, only two narrow strips can be taken out of each culm, so that even if the bamboos are of the finest quality and free from worms and burns (which is very seldom the case), it takes a large number to produce one rod. It is not unusual, taking them in the bulk, for an 18-feet rod to require as many as one hundred canes to be cut up and tested before sufficient warrantable material is procured.

The manufacture of split bamboo fishing rods is by no means new in England, as there seems good reason to believe that as far back as 1700 bamboos were brought from India by officers of the army, and that they were made into rods in London. With what success, however, we do not know; probably, from the makers having no experience with the material nor special plant for handling it, the rods were a failure.

The simplest form of building a rod is shown in section at Fig. 9, in which the equilateral form of the sections is clearly defined. Reference to the figure 8 will show how the sections are cut out of a bamboo for a single-built rod. This is the method generally employed in making trout rods. In order to further strengthen the sections for longer and more powerful rods, it is customary to remove the inner part, and replace it with the outer skin, and so build up a central section, as may be clearly seen in Fig. 10. This is called double-building. In extra powerful rods the centre of this internal hexagon of skin is a fine-tapered and hard-tempered spring steel core, as shown in Fig. 11. Rods so constructed are very powerful without being heavy, and have been in use for a number of years.

Cane-built rods are more generally made in the form of a hexagon, as shown in the illustrations noticed, but are also built octagonal and nonagonal, as may be seen in Figs. 12 and 13, both single and double, and with or without the steel centre.

Such, then, is the form of rod mostly used by anglers of the present day, and there is a great sense of security in their use, as one may essay the most difficult or long cast without fear of the rod coming to grief. You may fail in your cast or tire of the exertion necessary to reach some far-off fish, but need never fear the sudden smash consequent on catching a twig or branch, which is so fatal to wood rods.

The handle of the rod, or, to speak more correctly, the thickening up of the butt to form the grasp for the hands, is made of cedar, either plain or covered with pigskin or cork, the latter being most in favour, as it gives a sufficiently hard grip with a little spring in it, and never feels cold even when wet. A composition of ground cork cemented together is sometimes used, but is very much inferior to natural cork, and only employed where really fine sheets of cork cannot be obtained and properly manipulated. These very fine sheets of natural cork are cemented round the cane and turned true and smooth on a high-speed lathe.

The rings or line guides are of many forms, but the old-fashioned loose ring is seldom used nowadays. The spiral is a very good form, and held sway until superseded by the "Bridge" ring, which while stronger and retaining all the advantages of the spiral has few of its drawbacks. The ring at the top end of the rod is mostly of the revolving type, and made of tempered steel. A similar ring of a slightly larger size or an extra large "Bridge" ring is generally fitted as the first ring from the hand, and is an advantage when "shooting" the line.

The old heavy brass or gun-metal reel has given way to those made of lighter metals, which in the best work are of hard alloys composed largely of aluminium. The form has also changed from the slow-winding, wide-barrel type, with its small diameter, to the narrower form with a correspondingly larger diameter, which effects a great saving both in paying out and recovering the line. Reels which are easily dismounted for cleaning and have ball-bearings are much to be preferred for their free

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running and easy manipulation. The check should be adjustable, *i.e.* it should have an arrangement whereby the strength of the back check can be increased at will; but adjustable checks or drags which, when applied, *increase the resistance both ways* are to be avoided, as it is only in the direction of drawing out the line that any increase is desired.

Fig. 14 is an illustration of a favourite reel of the author's which has seen much service. The "revolving ring line guard" is an addition made in the spring of 1903, and is invaluable in preventing the line from getting round the back of the reel, which frequently occurs when "shooting" line. The perforations shown in the back plate are an advantage only in saving a little weight. The idea was that they helped to dry the line, and while they may do this to a very limited extent, they are liable to damage the dressing by the line when tightly put on being pressed into them. For this reason they are now discarded.

The question as to whether parallel or double tapered lines are better seems to have settled itself by a preference for the double taper. It can hardly be said, however, that the double taper casts better than the parallel, but it fishes finer towards the fly. The fine end of the reel line should have a plaited gut taper about seven feet long neatly married to it, terminating in a loop to which the gut cast (short and thick for heavy water and big flies, longer and finer for fine water and small flies) can be attached.

Such, then, in brief are the rod, reel, and line of the

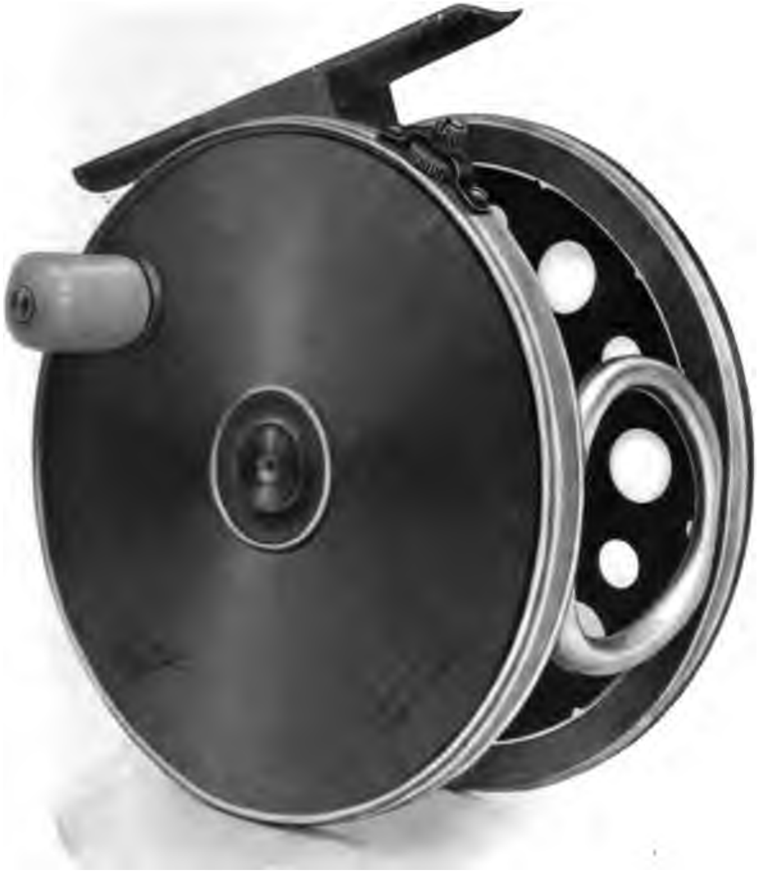
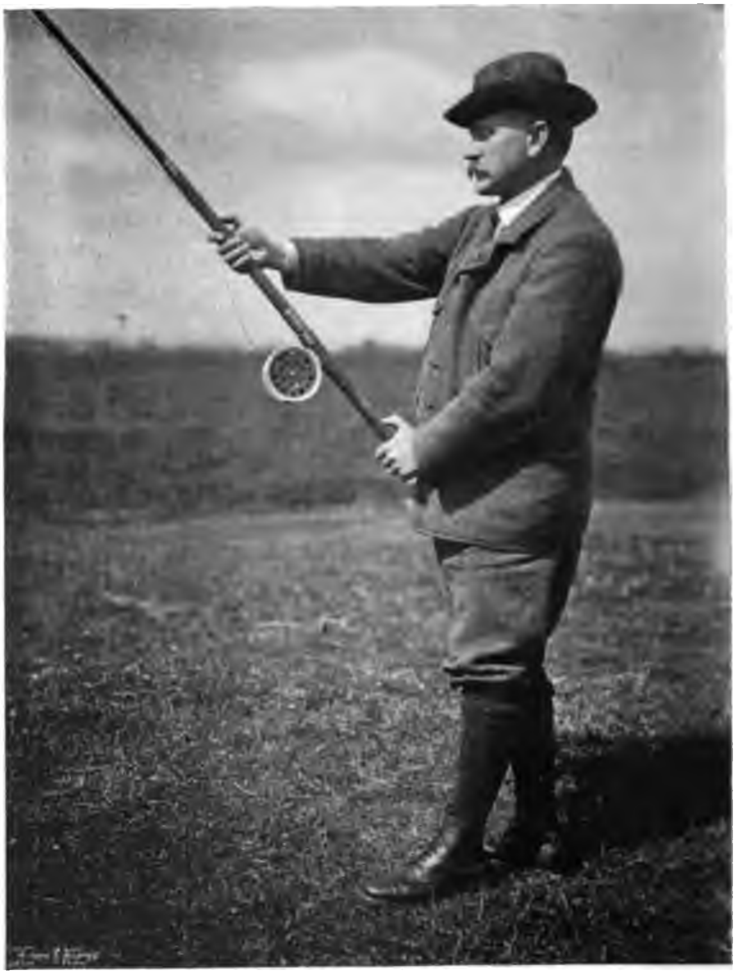


Fig. 14.—AN "UP-TO-DATE" REEL.



23.—GRASP OF THE ROD.

present day, but we can hardly leave the rod without saying a word about "balance." This is perhaps the most important item, as a rod, however well made, if imperfectly balanced is a failure. Going back to the old-fashioned rod with its quick taper and fine tops, we, of course, must remember that this form was used in the days of the light twisted hair line. The introduction of silk plaited with the hair to give strength eventually paved the way to the use of the silk-plaited line, which is now used heavily dressed with oil. A line of the weight now approved for rough weather fishing would destroy the very fine tops of the older rods, while the present rods carry it with ease, and yet are much lighter to work.

To describe the various balances, from the stiff Scotch type to the very supple slow-butted Irish rod, or the peculiar "Spey" with its bent top, would require a long chapter, and we must pass on, merely remarking that no doubt a great deal of our present information and knowledge has been obtained from a study of the merits or demerits of these older types.

A perfectly balanced rod should be capable of casting either a short or moderately long line equally well. A stiff-butted rod which does not commence to work until twenty-five yards of line is extended is naturally too stiff to cast nicely at fifteen to twenty yards. The most perfect rod in this respect may be compared to a gun, which should not be bored to shoot long shots only, but to do its work cleanly and well at twenty-five to thirty-five yards. A salmon rod should have its range at twenty to thirty yards to work easy, and when extra force is put into it, to get thirty-five yards is about as much as it should be called upon to do. If a rod is required for very long casting, then it should begin to work at, say, thirty yards and go up to forty. But, of course, such a rod is not easy to work, and will not make the shorter casts so well.

The form now approved has stout powerful tops and middles with a moderate play in the butt, the action coming well down into the hands. Such rods, known as the "Hi-Regan," "Kelson," and "Champion," have these characteristics more or less accentuated, and will do all the variety of casts necessary to ensure sport. There should be just that amount of elasticity which, when properly brought into action, effectually drives the fly to the spot desired with the least expenditure of exertion on the part of the caster. Stiff or improperly balanced rods entail a great deal of unnecessary labour. For instance, if a rod be too stiff in the butt, great force must be used to cause that stiff butt to spring sufficiently to do its work. On the other hand, if the butt be too supple to cast well into a wind, you may tear your heart out and tire yourself, but you won't get your fly to go through. The exact amount of movement which is called "pace" is difficult to determine or describe, and only experience and knowledge gained on the river will tell the maker when he is right. One 64th of an inch more or less in the butt of an 18-feet rod will make or mar that rod. How then, the reader may ask, can makers decide what is correct? The maker must have the correct article as his pattern, and it is customary for those manufacturers who are also skilled anglers to have patterns, which have been perfected at the river side, always at hand for comparison. The use of tables giving deflections under live and dead loads and the counting of vibrations help him greatly, while a quick and correct eye and the feel of the rod, aided by long practice, are necessary to success.

Well then, we hear some one ask, what rod would you advise? The balance and style which may safely be followed have already been indicated in the foregoing remarks, but the matter of length and weight depends upon the angler, the river, and the conditions under which he is to fish. Every man must choose for himself. He knows his own physical strength, and can easily lay his hands on rods varying from 16 to 18 feet in length, and so form his judgment as to what he can use with comfort, always being careful to choose a rod rather under than over his strength. A mistake may, however, be committed if he desires a cane-built rod and forms his judgment from the feel of a greenheart, as it must be remembered that a cane-built rod of much less comparative weight will do all the work of the heavier greenheart. His safest method, however, is to put himself into the hands of some first-class manufacturer, who also carries the reputation of a good angler.

It will serve as a general guide to weight and length, if the writer,[1] who is of full average physique, gives a description of three rods which he has used for many years with infinite satisfaction.

	Length.	Weight.	Distance from Centre of Reel to Button.	Centre of Gravity from Button.	Size of Reel and Line.
No. 1 "Champion"	17.9 ft.	2 lb. 8 oz.	11½ in.	3.4½ in.	4½ in.; 42 yds.; size 14 and 80 yds. backing.
No. 2 "Kelson"	17.3 ft.	2 lb. 6 oz.	11½ in.	3.7 in.	
No. 3 "Hi-Regan"	16 ft.	2 lb. 3¾ oz.	10 in.	3.1 in.	4½ in.; 42 yds.; size 15½ and 80 yds. backing.

The weights given do not include the rubber button.

No. 1 is a very useful type and does the "loop" cast fairly well with a size 15 line, although seen at its best in the overhead with size 15½. It has done a great deal of heavy work during the last twenty years, and although a light rod has fished some very heavy rivers. The balance is "all round," with moderate butt action, and suits most men who have tried it. This is the rod shown in Plates 23, 24, 25, 26, 27, and 28.

No. 2 is a comparatively new rod, and specially built for the "loop" cast, with which it will get out thirty to thirty-five yards in a very easy fashion with a size 14 line, while it will do a short overhand cast fairly well with a lighter line. The tops and middle are extra strong, while the butt has a lot of action right down to the hands. This rod's action is shown in Plates 29, 30, and 31. The last shows the action splendidly.

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[1] It may be said that in this description Mr. Hardy will seem, in the opinion of most who know him, to do his physical powers less than justice.—ED.

No. 3 is a beautiful little rod for an odd day or a small river, and does all the casts well, the action being equal throughout, with fair play in the butt. Of these three rods No. 2 is probably the best. It has this advantage, that while it fishes best in the "loop" cast with a size 14 line, it fishes well all round with a size 15, and will even work a lighter line in fine water.

No. 1, when used with a size 15½ line, does the "loop" cast fairly well, and fishes perfectly as an overhead rod.

The weight of the lines is important. Forty yards of size 14 (British wire-gauge) weighs 4 ozs.; size 15, 3½ ozs.; size 15½, 3 ozs. This will explain the foregoing remarks on the different rods, when it is borne in mind that, in order to do the "loop" cast properly, a heavy line must be used.[1]

We fish for sport, and in order to enjoy that to the fullest extent means that you must not exert yourself more than is reasonable or necessary to effect the purpose in hand. There is a great pleasure to be derived from the mere casting of your fly, and the consciousness of knowing and feeling that you are doing your work cleanly and well. The rod, as we have said, must have the power to lift and propel with ease, say, thirty yards of suitable line, and to effect this the tops must be stout and the action even throughout the entire length. Every inch must be muscle from the graduated point down to the hand, and must bear its due proportion of work.

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[1] I have given the size of the lines according to the standard British wire-gauge, because no comparison can be made from makers' sizes, which are all different.

That a poor workman with good tools will not do as well as a good workman with bad tools is well known, but can hardly be adduced as an argument against good tools; in fact, they cannot be too good. There is no economy in selecting any sporting article because of its low price. As a matter of fact, the great probability is that the more expensive article will give the greater satisfaction, and prove the cheaper in the end. In any case, why save a few pounds on the outfit, when the rent and other expenses of a fishing are probably ten times greater. Moreover the outfit does not stop at one season like the rent, and, if properly selected, will last a great many years—probably a lifetime.

CHAPTER VII

CASTING THE SALMON FLY

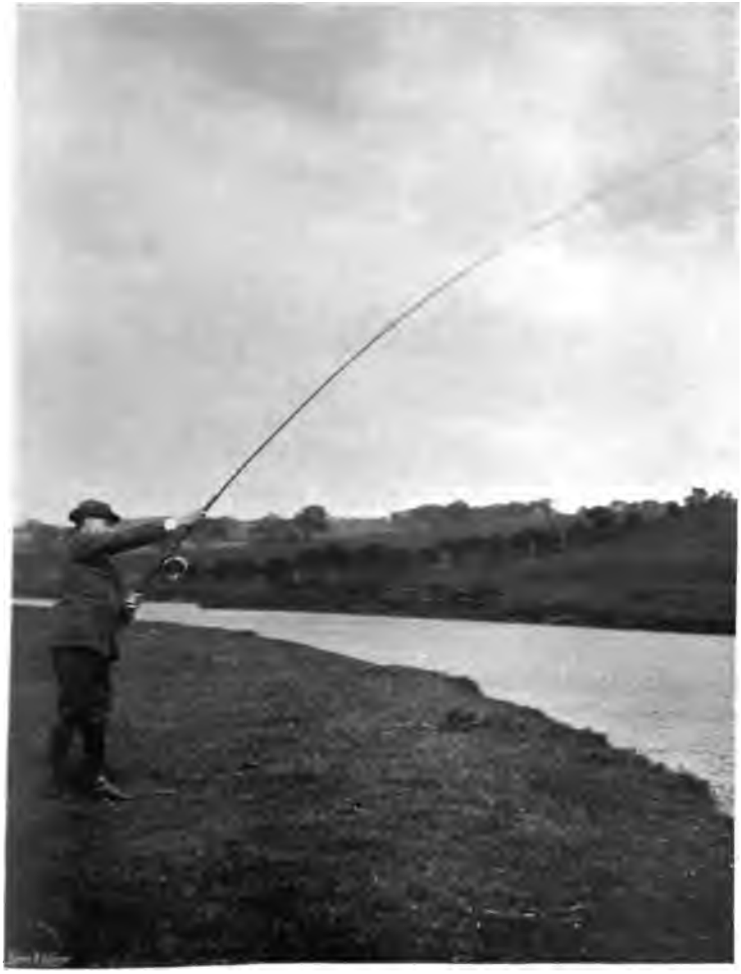
By John James Hardy

To be a master of the art of throwing the salmon fly one must be able to do four different casts. 1, The "overhead"; 2, the "wind" cast; 3, the "loop" cast; 4, the "switch." Of these, the "switch" is ably dealt with in another part of this work, and need not be described here.

To perform any of these casts correctly, so as to get the best result from the force employed, style is all important. A good style means easy and clean manipulation, with just that nice degree of force thrown into the cast from start to finish which will cause the fly to travel to the desired spot, and fall lightly on the water.

Beginners are too prone to commence carelessly in their own way to learn the art of casting, and often develop habits which it is difficult for them to unlearn, and it is for this reason that one cannot too strongly impress on the "tiro" the necessity of either watching some really good caster at work and attempting to imitate his movements, or putting himself into the hands of a good exponent of the art, and faithfully trying to carry out the instructions he receives. There is little difficulty if he does this in the first instance, and has the requisite patience and perseverance.

In recent years several tournaments have been held in which records in distance casting have been made, but, it may be asked, "Have they taught us anything?" If we leave out the fact that they have shown us what athletes, trained to use great rods fitted with very heavy lines, can do, they cannot be said to have achieved much. In these competitions rods have been used almost double the weight necessary or desirable for fishing, fitted with great lines weighing for their forty yards as much as five ounces. It is not difficult to discover how these heavy lines fitted with a fine back line may be made to travel a great distance when forced forward with a powerful eighteen or nineteen feet rod, when one considers that the weight of the lines is double that of the leads used on spinning rods, with which casts of over eighty yards have been made. The weight in the case of the fly line is distributed over the forty yards, while in the case of the spinning lead it is at



24.—LIFTING, ETC.

or trees may be encountered necessitating a different cast, and here the "loop" or "Spey" must be used. Or, again, the pool may be at a bend of the river, so that, in fishing it down, the wind prevents the same cast being used throughout. In early spring fishing it will often be found that, in consequence of the varying direction of the wind, two consecutive casts cannot be made alike. The gusts have to be watched and the casts made to suit the ever-changing conditions. One minute the wind may be in your face, in which case the "loop" cast is somewhat dangerous, therefore the "wind" cast must be used, and so on.

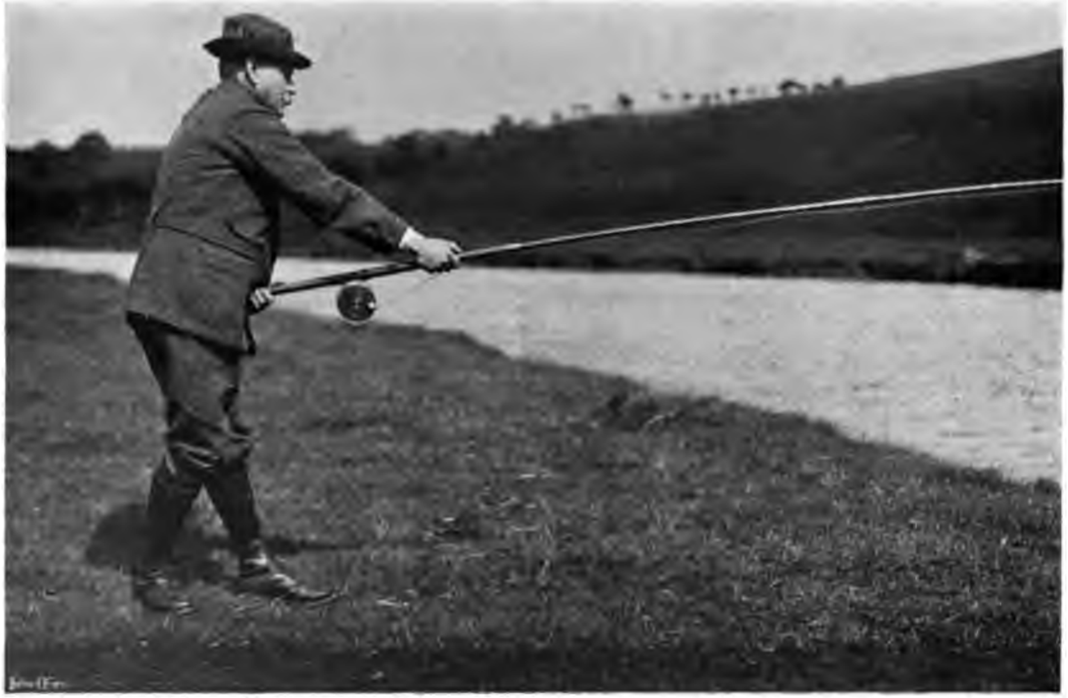
As we have said, it leads us nowhere to find out which athlete, armed with a pole, can cast a fly farthest, as, after all, we do not want to cast fifty yards, for, as a matter of fact, thirty is about as much as one need do except in very occasional places, and the forty-yard cast is better left to the strong man and his big rod.

But to return to our lesson. The mistake the beginner generally falls into is putting too much force into the cast. He should remember that it is his province to start the line on its journey, and guide its direction, but that the rod must do as much of the work as possible. If this is carefully studied it eases the rod greatly, and the caster will be agreeably surprised when he sees how much farther and better his fly travels.

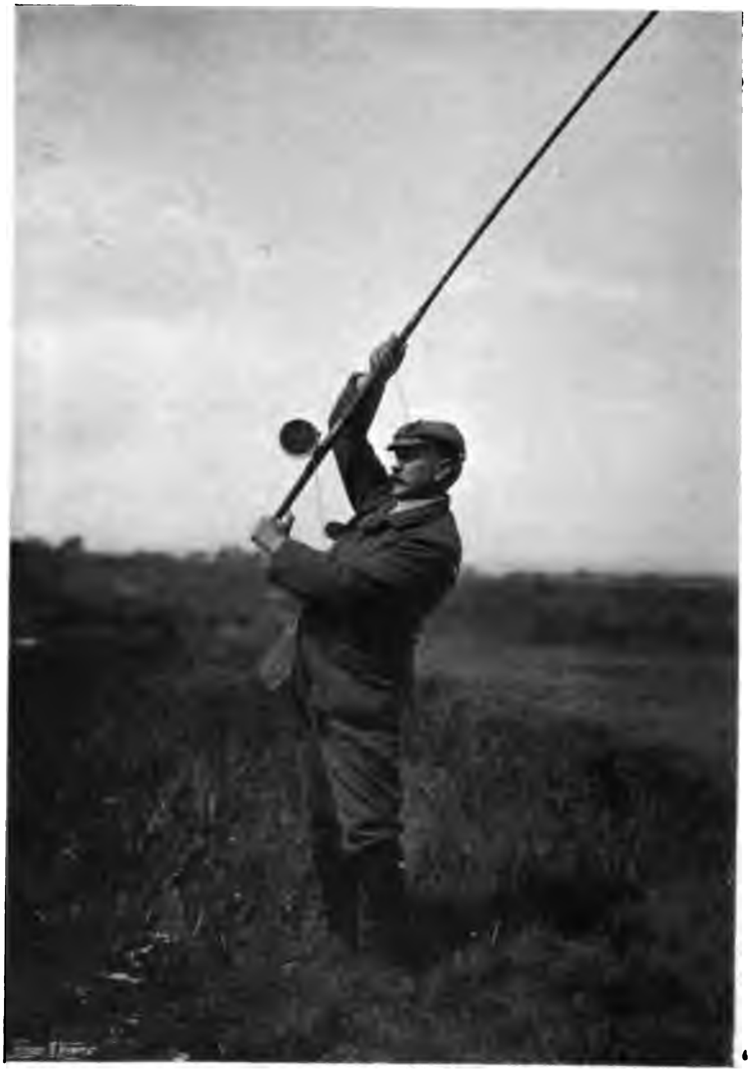
In describing the "overhead" cast and how to perform it an indication of the position is very important. The left foot should point in a line with the direction in which the cast is to be made, while the right should be almost at right angles to it. The rod should be lightly held with the left hand at the butt end (see illustration, Plate 23), while the right should grasp the handle firmly, about twelve inches above the reel. Twenty yards of line should be drawn off the reel, with a gut cast fastened to the end of it, to which an old fly (of which the barb and part of the bend has been broken) is attached. The line should then be extended at full length on the lawn with the rod point about three feet from the ground. The caster should now lift the line, beginning the movement from the position the rod is shown at in illustration, Plate 24. His object should be to throw the line behind him, and as high into the air as he can. The rod should not be held vertically, but with the point inclining about ten degrees to the right, and the effort should be directed to spread out, as it were, the line and fly well up in the air and behind. The rod, however, should not be thrown back more than about ten degrees from the perpendicular (see Plate 25). Throwing the rod too far back is a temptation all learners suffer from. After making the back cast the thrower should turn his head and watch the course of the line as it flies backwards, and so note the time of the return cast, which should be made just before the line is quite extended. It should be his aim, in the first place, to get off by heart how to lift and throw the line well up and behind, and he should practise this until he can do it in a satisfactory manner, which may be determined by watching the course of the fly. The presence of a friend is a great help, as he can watch the curl of the line and fly, and assist by saying " now " just at the moment it is best to make the return cast. This will give the time, which the caster can afterwards calculate himself, bearing in mind that the longer the line the more time is required. The friend should only correct for a few times and then leave the performer to time himself. If then he blunders he can be corrected again, and so on, until he has thoroughly mastered this part of the work.

Having accomplished this, he should now make the return cast, and time this as before mentioned by watching the line (see Plate 26), and just before it is fully extended complete the cast by bringing the rod down smartly again to position (shown in Plate 26). Remember that in making the back cast the rod should not be thrown farther back than shown in Plate 25, and that time and pace are the important factors.

Having with a short line mastered this, he may extend the cast a yard at a time, until he reaches about twenty-five yards, when he may farther extend it by " shooting " a yard or two of line. This shooting eases the rod, enables a longer cast to be made, and assures the fly falling lightly on the water. Two yards will be sufficient loose line to begin with. This should be held under the forefinger of the



26.—FINISH OF THE "OVERHEAD" CAST.



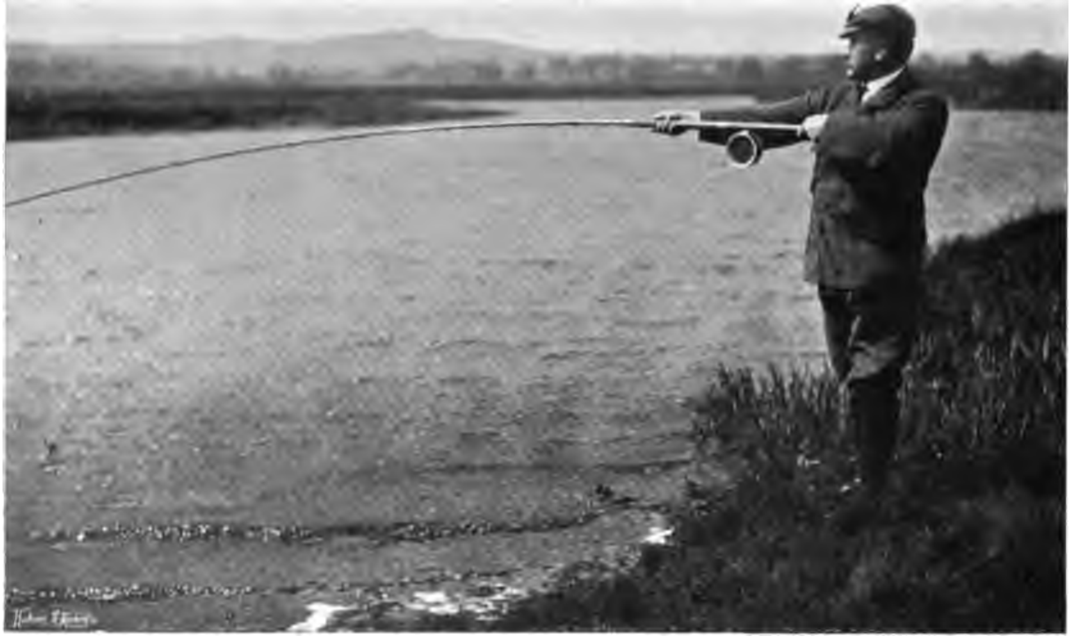
27.—MAKING THE "WIND" CAST.

right hand, and when the down stroke has been made and the line is travelling it should be released. Before making the next cast this slack line should be gathered and held as before. In making the forward stroke it is important that the line should be properly extended behind, as the pull back on the rod from the weight of the extended line does a part of the work, and all the angler requires to do is to smartly drive the line forward at the proper time, aiming at a point, say, two yards above where he desires his fly to alight, releasing the slack just at the end of the cast, really *when the fly is lighting*. Of course much depends on the wind, which if against the caster will require more force put into the forward stroke.

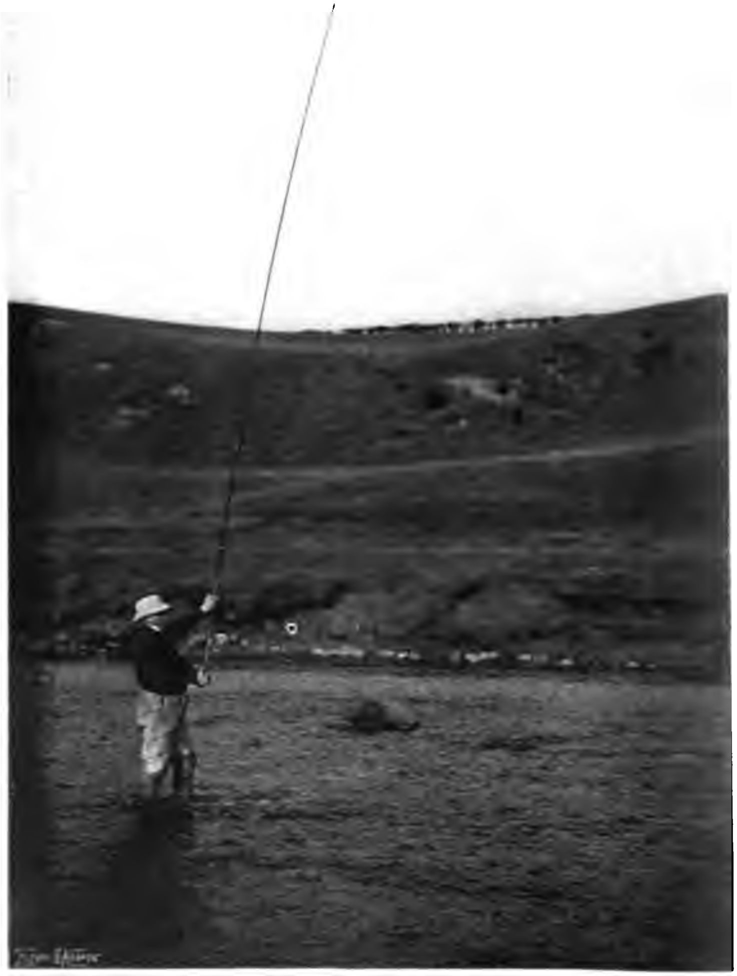
This "overhead" cast is the simplest of all and is the most practised, as one generally has a trout fisher's experience with the single-handed rod (with which this cast is generally used) before commencing salmon fishing.

The "Wind" Cast.—This is very similar to the overhead, and is mainly used when the wind is blowing strongly across stream, striking the angler's right shoulder when fishing from the left bank, so that should he lift his fly in the usual overhead method it would most likely be blown against himself or the bank at his feet. Plate 27 clearly indicates the grip of the hands. The position from which the fly is lifted is that shown in the overhead, Plate 24, but the rod, instead of being thrown back over the right shoulder, is brought squarely across the front of the body, care being taken to throw the line well up so that the wind helps the back cast. In driving the fly forward at the finish of the cast, let the left hand come well up to permit the rod to freely assume the horizontal (Plate 28). There is a good deal of wrist action in the movement which must not be checked.

The "loop" cast may be described as a sort of modified switch, and can only be effectually performed when there is a fair stream to pull the fly. Assuming that the line has been cast and the fly is hanging in the stream some twenty-five yards below, draw in about a couple of yards, and hold it under the forefinger of the right hand, as described in the "overhead" cast. The rod should now be raised to position shown in Plate 29, with the arms extended as far as possible away from the body. Plate 30 shows the rod describing the loop with the rod's point as it is brought round. Plate 31 shows the finish of this cast. The fly should clear the water when about six yards from the angler, and as he makes the effort he should steadily increase the pace until he comes to the down throw, into which he must put as much force as he can. This cast, unlike the "overhead" with its two distinct movements, is one continuous effort, increasing in pace towards the end. In delivering the fly at the finish of this cast, the rod point may be forced out almost at right angles if necessary, according to where the fly is desired to fall, but it is best at about an angle of 45 degrees to the stream.



28.—FINISH OF THE "WIND" CAST.



2).—POSITION No. 1 IN THE "LOOP" CAST.

When shooting line at the finish of any of the casts, should it not shoot clean, draw it taut before commencing to fish, so as to have a tight line to the fly.

In preparing for a fresh cast draw the fly by a movement of the rod quite to the top of the water before lifting it. Should the fly work into an eddy and sink shake the rod top sideways and shorten the line a little by drawing in with the hand before lifting. This is a very important matter, as to attempt to lift a drowned line, if it does not break the rod, certainly prevents a clean or decent cast being made.

If the wind be against you it is necessary to "force" the casts, *i.e.* the finish of the cast must be vigorously done and the rod point allowed to come well down to the water with freedom. It should not be checked by too firm a grip with the casting hand, but held loosely, so that the rod gives full effect to the force and wrist action employed.

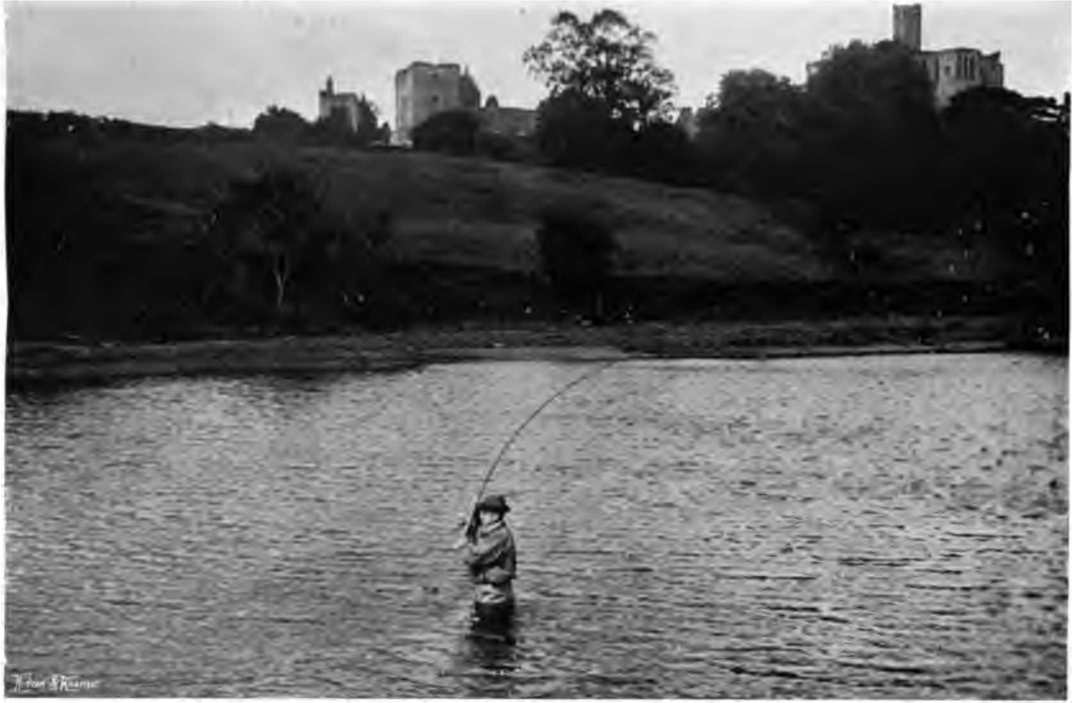
In fishing deep sluggish rivers it is often necessary to weight the gut line by wrapping round it lead wire so as to take the fly well down to the fish. This lead makes casting very difficult, and a long line should not be used. It is not possible to cast this in the usual method, and a sort of "sling" must be used, the forward cast being made when the line is felt to be well extended behind.

In fishing from the right bank of a river the left hand should be used to cast, and from the left bank the right hand.

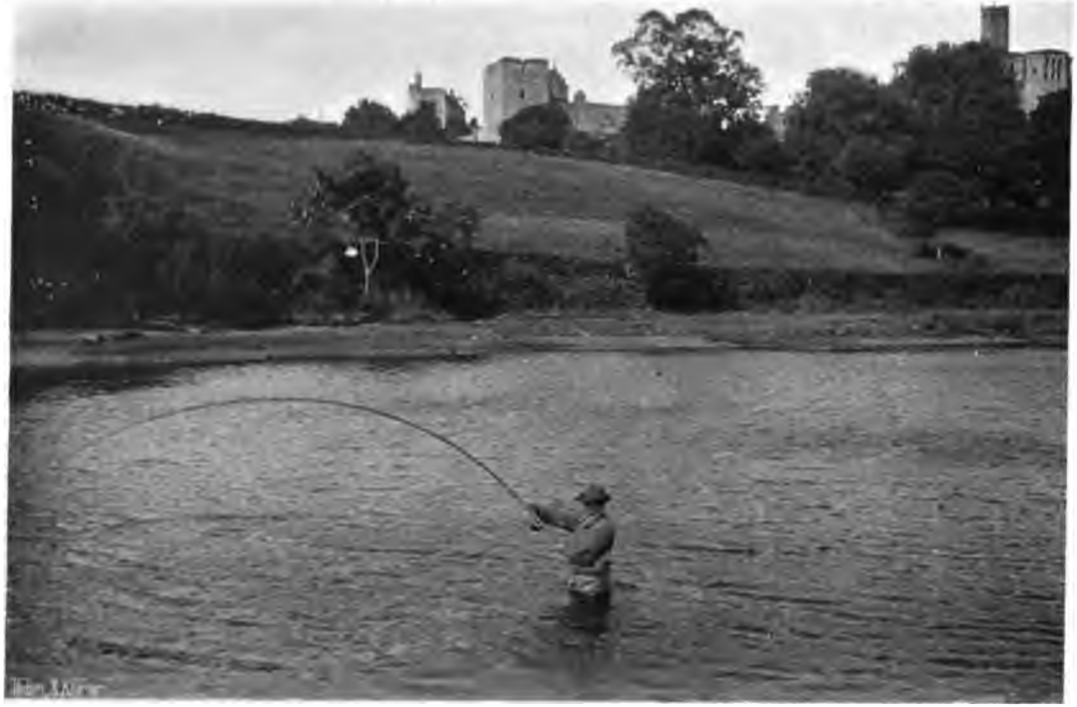
The "overhead" and "wind" cast can be practised on a lawn fairly well, but the "loop" cast is more difficult as you have not the necessary current to give the pull on the line. Practice of this sort should be resorted to where possible, as it helps the muscles greatly, and gets them into a better condition to stand the fatigue of a day's fishing.

In briefly describing these various casts and how to perform them, the object aimed at will have been accomplished if the man who aspires to be a salmon angler has in some sort of way received a fair impression of the methods by which a fly may be propelled, but he has yet an important task before him, and that is, the actual work on the river.

Salmon fishing is at all times heavy work, both in casting and wading, and it has always been a study to make it as little fatiguing as possible. The position of the body is important, and the one which should be assumed whenever possible is the erect. After delivering the fly let the arms hang down by the side naturally as far as possible, as shown in Plate 33. Do not rest the rod against the groin and bend your back, as shown in Plate 34. Should it be necessary to have the rod in this position straighten the back and hold the rod with one hand only as the fly sweeps round.



30.—ILLUSTRATING THE "LOOP" CAST.



31. FINISH OF THE "LOOP" CAST.

An aching back comes without seeking it in this kind of sport, but the man who finds himself able to place his fly easily and without much exertion with reasonable delicacy on the water will derive enjoyment from the mere practice of casting, and stand a fair chance of killing fish. To attempt, however, to do by force what should be accomplished by art will only disturb the pools and destroy one's own chance of sport and that of any one following.

In commencing to fish a pool a careful mental note should be taken of all the surroundings, such as the character of the bank, trees, &c., in order to avoid catching your fly in undesirable places. Ask your ghillie to watch the line and tell you where the fly is going in the back cast. This is a great help even to an expert.

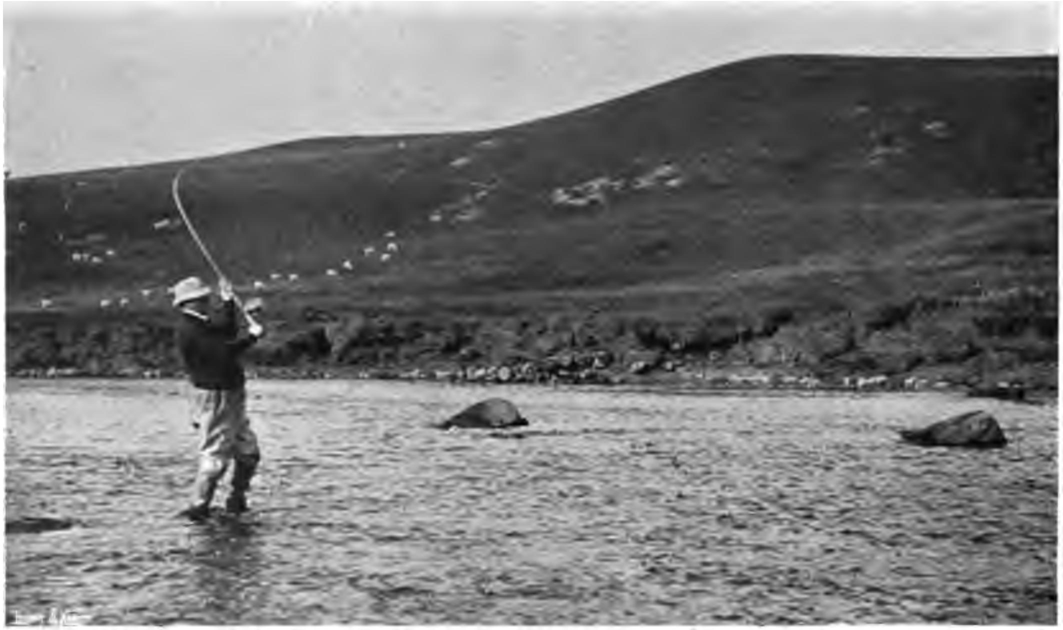
Slogging out a long line does not mean good fishing, and often defeats itself. A longer line than is necessary to cover the lie of the fish should not be used. When fishing a pool with which you are unacquainted ask your ghillie where the fish lie, and to tell you when your fly has covered them. There are, however, places where a long line must be cast, as, for instance, when the "lie" of the fish is on the far side of the stream. Here you must cast a long line down stream, and hold up the point of your rod in order to keep the line as far over as possible.

If from the position you are in you cannot cast far enough down stream to reach a desired spot, you may drift the fly down by paying off line until it is over the place, and then work it by drawing in and letting out line with the hand.

Short casts can be made from positions under trees by getting your ghillie to hold the fly lightly between his fingers at a suitable distance from you, when at the word "go" you make a forward cast. A forty-five to fifty yards' cast can be made in the open in the same way, if desired, by getting the ghillie to carry the fly to the required distance, and hold it lightly between his finger and thumb, when at the word "go" you make the forward stroke, but such casts are rarely of any use.

If in casting the line does not appear to be extending properly, snatching back the slack with the left hand, while at the same time jerking the rod slightly upward, will generally cause the fly to shoot out straight and so save the cast.

In waters fished in regular beats there are often difficult casts, which are consequently less fished than the more open ones, and for this reason they are always well worth a trial as generally more certain to yield a fish. This particularly holds good in hotel waters, which are much fished, and to these places special attention should be given, as the probability is that they have not been fished by the angler who had that beat the day before. An overhanging tree in a difficult position, or a sharp intermediate stream, dragging the line so that the fly does not come over the fish properly unless well

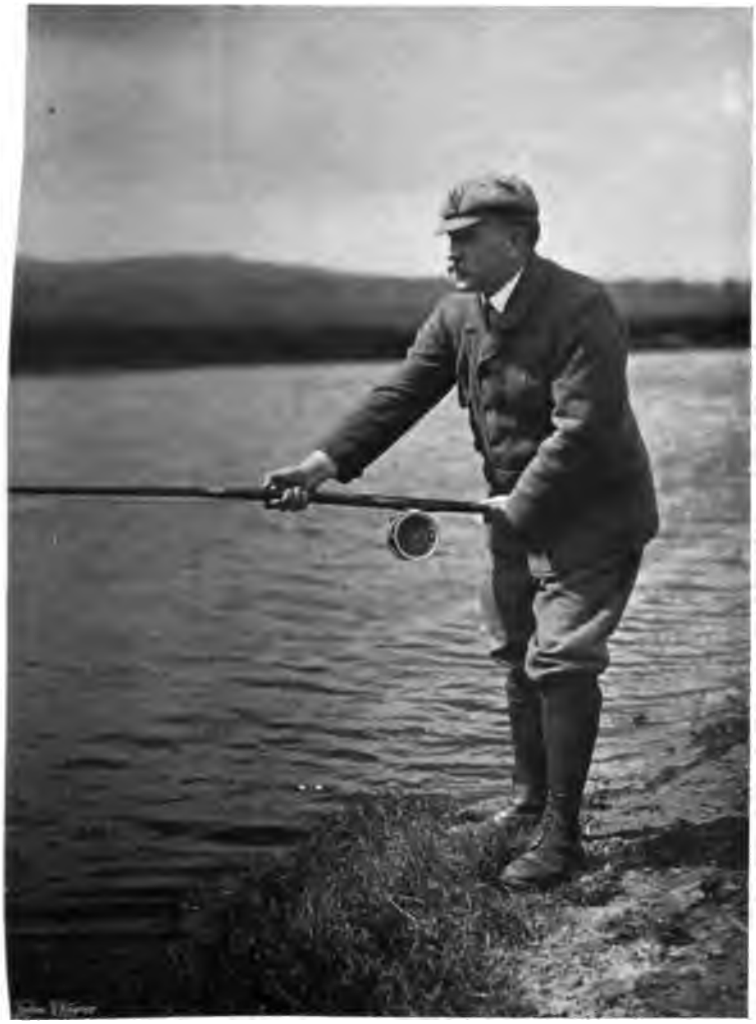


32.--LEFT-HANDED "LOOP" CAST.

than when standing on the bank on a level with or above the water. This, however, is inappreciable if only wading knee deep. When wading deep the difficulty in casting is greatly increased, as the height of the angler is decreased by the depth he is standing in the water. Consequently, in order to get the same length of cast as from the bank he must throw his fly much higher in the back cast, if using the "overhead," which he can generally do in this position. If, however, he is using the "loop" cast it is more difficult to get out a long line.

Casting from a boat is naturally easy, but if using the "loop" cast with a wind from the rod side have a care for the poor ghillie, who may not be hook proof.

The question as to whether movement should be given to the rod while the fly is swimming round is one on which opinion differs a good deal, but it may be held that this movement of the rod has little effect on the fly until it comes into the straight. If, however, it pleases the angler by all means let him indulge himself, as it does no harm. One is apt to imagine that a salmon fly plays in the water, and that when the rod point is lowered it drifts backwards and so forces the hackles against the stream and spreads them out, and that when the rod point is raised and the fly pulled against the stream they close again; but this is an error, as the fly would require to travel down stream at a greater rate than the stream itself, which is, of course,



31.—*INCORRECT POSITION IN FISHING OUT A CAST.*

impossible. In quiet water or an eddy, however, the case is different, and there the fly does work. An observation of a salmon fly crossing a current shows that the wings and hackle close round the body and remain in that position.

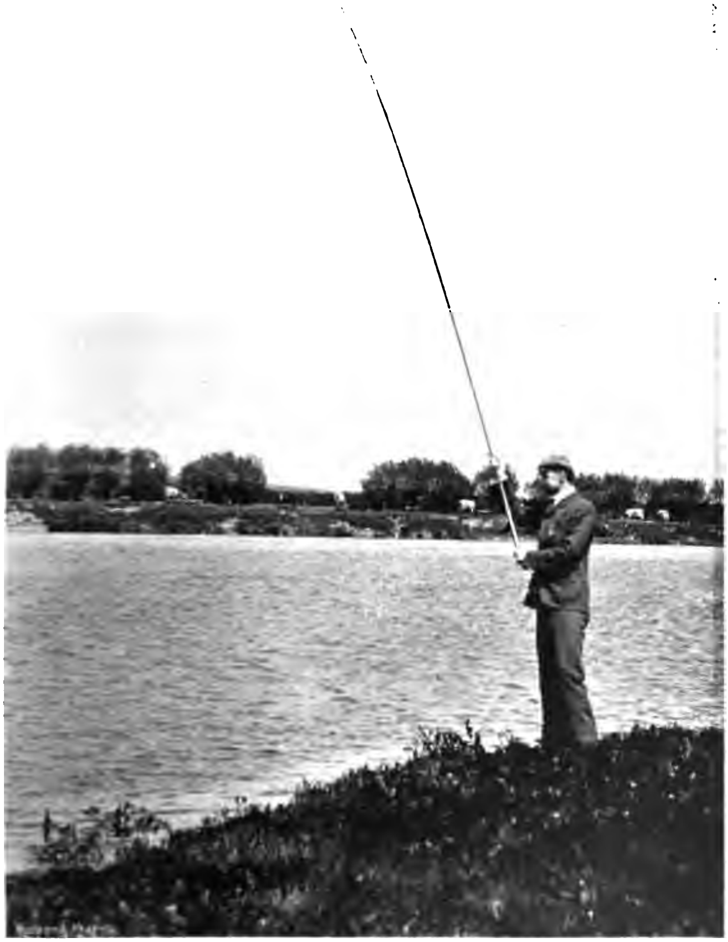
CHAPTER VIII

THE SPEY THROW

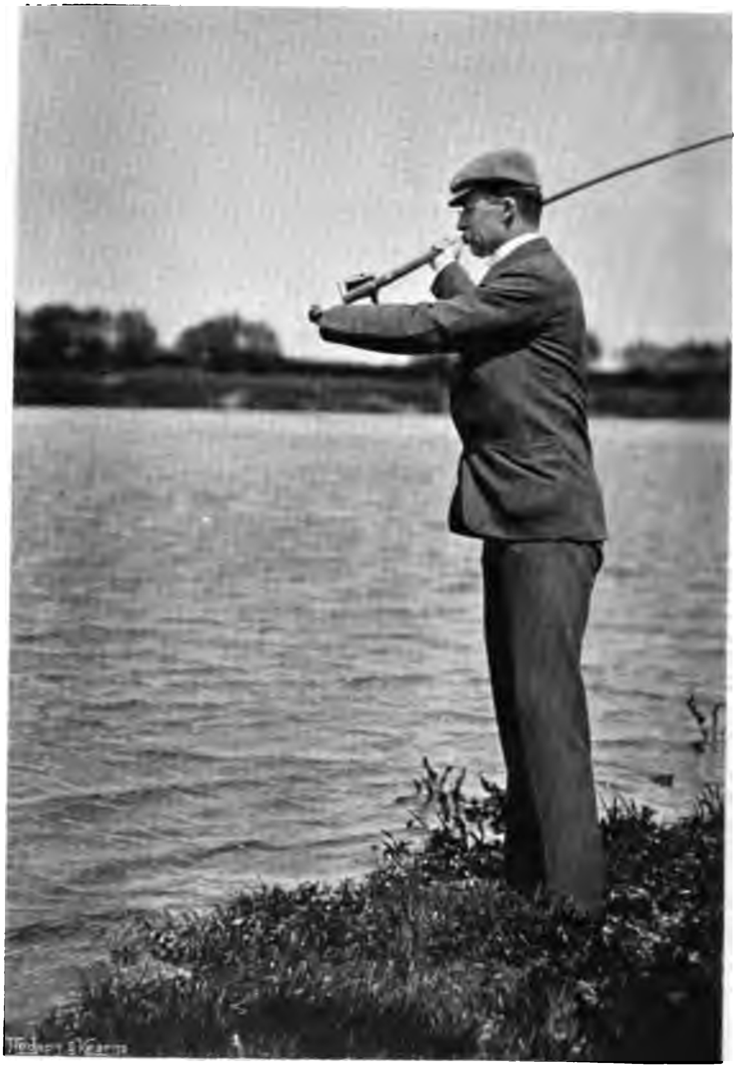
From Notes by Lord Walter Gordon-Lennox

The Spey throw, or Spey cast, as it is more often called by those who admire it at a respectful distance, is a departure from the normal method of throwing a fly for salmon that is made necessary by the formation of certain river beds. Most notable of these is the river that has given its name to this throw, the magnificent Spey. Magnificent that river is; as a salmon producer, unfortunately less prolific than it used to be, because—of what shall we say? We may all have our suspicions and our theories as to the true cause of the decreased production of salmon, but after all it is "another story." Let us move to surer ground.

There are other rivers in Scotland besides the Spey



35.—LIFTING FOR THE SPEY THROW.



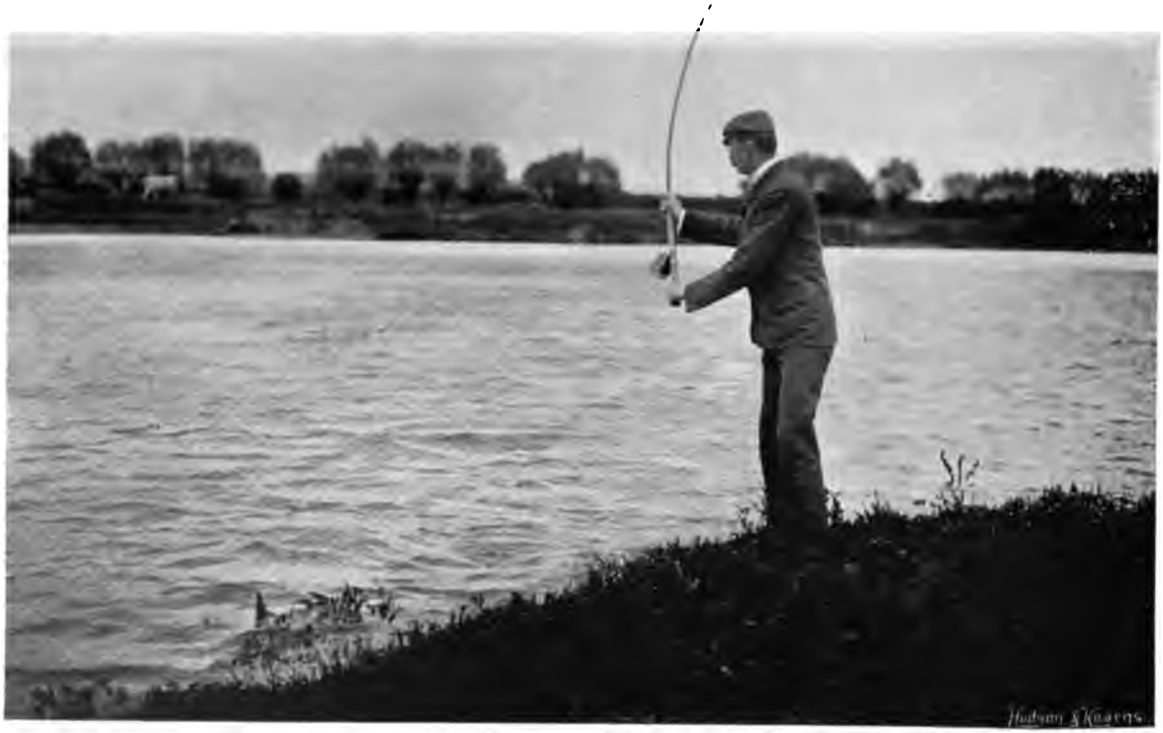
36.—FARTHEST BACK.

itself on which the ability to execute the Spey throw is invaluable, enabling an angler who has this stroke in his keeping to fish whole pools and parts of pools that are not within the philosophy of the less variously gifted; and the rivers that have the characteristics requiring the Spey throw are generally just those that are the most fascinating to fish and to admire, such, for instance, as the Findhorn, the North Esk, in parts, here and there a pool on the Ugie, a place or two, in certain states of water, on the Tay, and so on, to mention a few as they come uppermost in the writer's mind. The object of the Spey throw, it perhaps goes without saying, is to enable a man to get his line out over a pool where the banks of the river behind him are so steep or so wooded that he cannot throw out the line behind to get the ordinary purchase for the overhead throw; places where even that clever upward cast of the line over the head, such as is known to many cunning fishers of the Tay, would not get the fly clear of the encumbrances behind. In such places as these, if they are to be fished at all, it is necessary that some *tour de force* be employed, for they are places where the boat fishing and the wading alike are impossible or useless. It remains only to throw the line forward off the water, picking the end of it off the water by the force of the throw.

It sounds, no doubt, to those who do not know "the way it is done," a sheer impossibility, a conjuring trick. In matter of fact it is a throw that presents no immense difficulty—for the passable execution of it, let us say. To do the simplest thing supremely well requires the hand and eye of an artist, and this Spey throw is far from the simplest of things. On the other hand, it is a thing that has been much overrated, in respect of difficulty of accomplishment, in common report. It is a throw that any man may learn with a little patience and trouble. It requires, perhaps more than anything else, an accurate sense of timing that is something like a musical gift. To become a past-master one should have practised from boyhood, but without being a past-master one can learn enough to make easy the fishing of many a pool that would have been impossible but for this little bit of knowledge; and, moreover, when a man has learned the Spey throw he will generally prefer to use it rather than the more common throw behind the back. It is a throw that demands far less exertion.

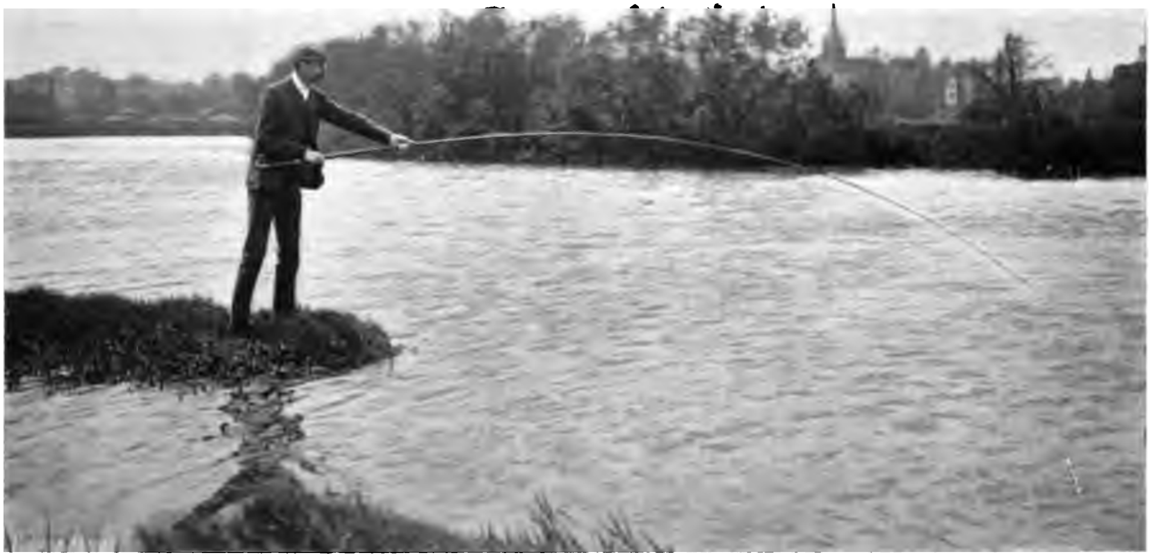
It is perhaps best to begin with a general description of this fascinating throw before entering on its details. It is not an easy matter to make clear to the mind of the reader who brings to it the mental *tabula rasa* of complete ignorance, and the writer would therefore ask the reader's earnest attention and charitable long-suffering.

The fly, the cast, and some yards of the line lie on the water, down-stream from the angler, at the moment that he throws the rod upward and up-stream to something like an angle of 45 degs. pointing behind his head. This upward throw of the rod carries out over the water up-stream as much of the



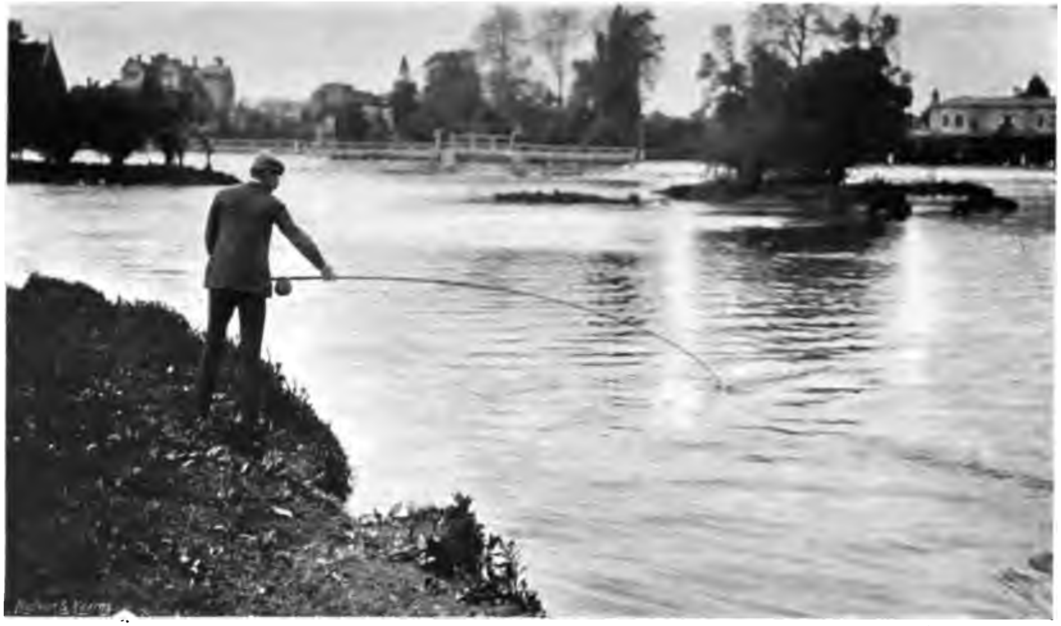
Hudson & Kearns

37.—THE FORWARD-GOING ROD.

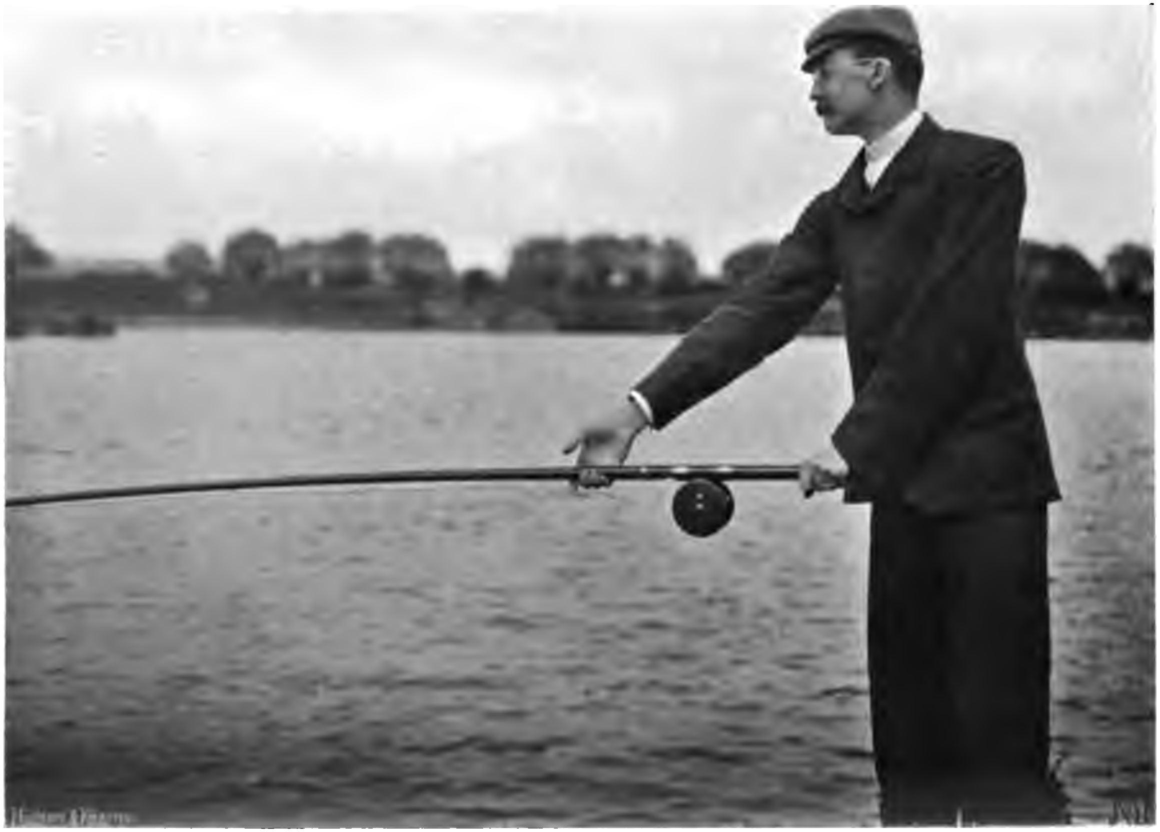


38. THE BELLYING LINE.

line as the rod, when raised to something like the perpendicular, had lifted off the water, and lays it for a moment on the water again behind or beside the thrower, whence it is immediately shot out again, in a straight line, the fly alighting last. The force of the belly of the line going out over the water is sufficient to lift off the water the end of the line with the cast and fly, and to carry these out in a straight line away from the thrower and lay them down, the fly being the last to touch the water, and touching it at the point farthest from the thrower. That is a very rough general description of the throw. Two points, even from this rough description, should appear; first, that it is important that the rod should be a long one, since it is evident that the longer the rod the greater the length of the line that it can lift off the water before the actual throw is begun; and, secondly, that it is important that the line be a fairly heavy one, since it is the momentum of the belly of the line that has to pick up the tail of the line and the cast and fly off the water and carry them out. In point of fact we do find the rods in use on the Spey of full 18 feet in length, of special make, and the lines heavy. The weight of the line further suggests that the rod should be a powerful as well as a long one, and this, too, we find to be the character of the rods in use. Nevertheless, an ordinary 18-feet or even 16-feet split cane rod with steel centre will do all that ordinary situations require in the way of the Spey throw; but the line *must* be a fairly heavy one. That is a *sine quâ non*, We will now attempt a more detailed account of the methods of this throw, beginning with the moment at which the fly, after being thrown rather across and rather down stream, has swung round, through the main current, and has virtually ceased business in the still water at the edge of the river. The first thing, by way of preparing for the new throw, is to raise the rod steadily, drawing the point of the rod rather in the up-stream direction as you do so. The effect of this is that by the time you have the rod in the position shown in the illustration No. 35, and named "Lifting," a considerable part of the line is lifted off the water and held more or less straight, from point of rod to the point where the line touches water, by the drag of the tail of the line lying rather at an angle to it, down-stream. Then you begin to put a little more life into the stroke. You have taken it just as far as you can take it by the lifting method. The further actions are quicker, yet still they must be smooth. You bring the rod back to the position in No. 36, called "Farthest Back," and then with a sense of the right psychological moment, that a little practice, and nothing but practice, will give you, bring the rod forward again with a well-timed even swing, as shown by the strain on "The Forward-going Rod" in No. 37 illustration. This movement is continued until the point of the rod almost touches the water (it makes no matter if it does touch it quite), as is shown in picture No. 38, "The Bellying Line." In the original photograph the bellying line is actually



39.—SPLASH OF LINE ON WATER BEFORE GOING OUT.



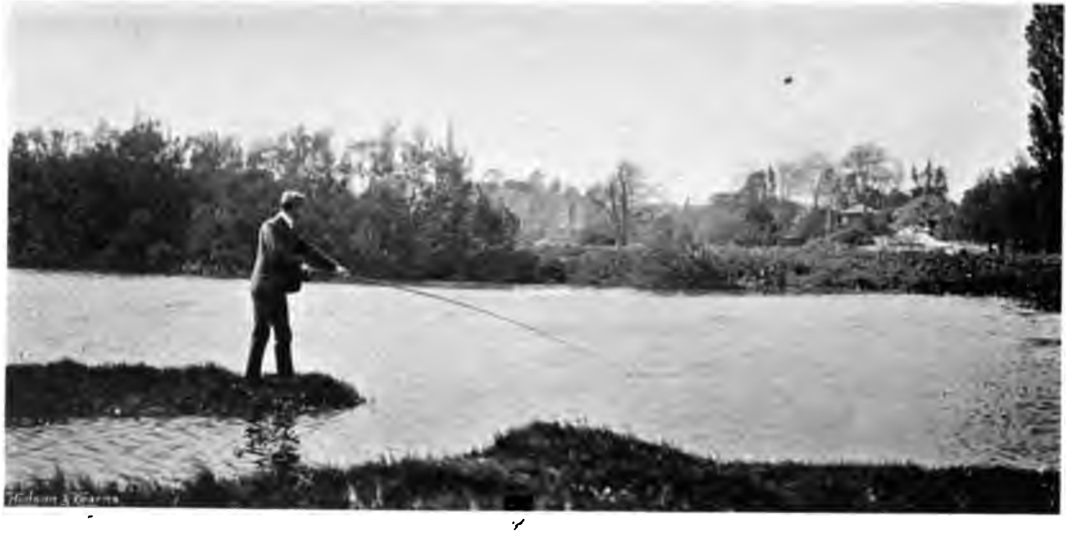
40.—THE THROWER WATCHES THE FLY ALIGHT

to be seen; and that is why we have selected this photograph of a left-handed throw by way of illustration, in a series of right-handed throwings. Of course all operations are the same, *mutatis mutandis*. But in case this line may not actually appear in the reproduction, it may be said that it goes in the direction of an elliptical curve, convex upwards, from the point of the rod, cutting in half the church steeple. That will indicate the direction of the curve well enough. And in order to form itself into this curve the line had to do several things after reaching the point seen in picture No. 36. All subsequent movements of the rod backwards and forwards will have tended to drawing the fly farther and farther up-stream, until not many yards of line are left on the water at all. And when the rod point was thrown down to the water's level, and the upper part of the line sent out curving over the river, the weight of this curving part of the line and its momentum has picked up the tail of the line off the stream—at first with a slight inclination up-stream—and will then take it straight out in the direction indicated to it by the direction in which the rod point has been brought down to the water, in a beautiful concave curve that lays the fly on the water last, and farthest from the thrower. The manner in which the fly comes out from under the curving part of the line, thanks to the slight up-stream inclination that the tail end of the line has when it first leaves the water, is very pretty, giving the idea that the fly must know that its business is to escape the threatened entanglement. Then the line all uncurls most beautifully, as "The Thrower Watches the Fly Alight," at the end of thirty yards of line going out (as it almost seems of its own initiative), drawn spinning out, in sober fact, by the weight of the bellying line.

After a fashion, as has been said, this Spey throw can be done with any rod, but power in the butt and even spring throughout are of such advantage that the convenience of the ordinary jointed rod is generally sacrificed to them in the rods in common use on the Spey. The true Spey rod is glued, spliced, and whipped throughout, never taken to pieces. With ash butt, hickory centre-piece, and lancewood top, the whole is welded into a weapon of most responsive play to the hand. The spring is more evenly distributed than can possibly be the case in a rod with rigid joints. Most rods are rather too supple at the butt, giving too much in the hand, for Spey throwing. There is no throw in which the fisher is more dependent on his rod; for in point of fact he does but give the direction and the time, the rod "does the rest." The rod doing its work, while the thrower looks on, is well shown in the illustration No. 39.

The last two illustrations are interesting as showing, in the first, "The Splash of the Line on the Water before Going Out," and in the second "The Line Cutting the Water as it Goes Out."

There are some fishermen, uninitiated in the Spey throw, who speak of it rather in terms of "flicking" and of "switching." Any notion of jerky action



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41.—LINE CUTTING THE WATER AS IT GOES OUT.

42.—HARD WADING.

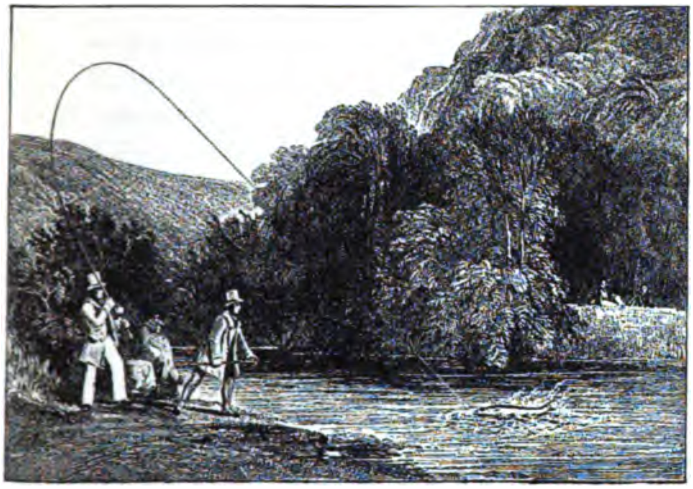
such as these words convey, is wholly out of place, and should be banished from the category of him who would learn to make this throw aright. The throw is one long, steady swing from the time you have lifted the rod till the throw is finished.

Lord Walter Gordon-Lennox writes the following account of this evasive business: "I should describe the movements as follows: 1. Lift the rod so as to clear a sufficient amount of line to enable you to lift the rest out of the water. You may then pause for a second to prepare yourself for the effect of the throw. 2. A long steady swing, without jerk or pause, in an up-stream direction. 3. When your arm is fully extended up-stream, continue the long steady swing, only changing the direction to where you want your fly to go.

"The advantages of this over overhead throwing are: 1. The immense saving of labour, in that your arm is never above the level of your shoulder, and (2) the length of line you can throw, which is limited only by the amount you can lift out of the water. Obviously you can deal with more line when you have only to take it out of the water, swing it along at a low level, and put it into the water again, than if you have to lift the whole amount to a great height over your head, quite apart from the question of banks and trees behind you."

The words of the expert! wherein, if we can grasp it, lies the secret of his expertness. But these are mysteries that are not easy of comprehension. Patience and perseverance are the keys that unlock them—patient and persevering practice, based on a sufficient knowledge of the principles to prevent their misapplication. The principles we have endeavoured, as best we may, to make as plain as written words may make them. We must pray, in return, the best intelligence of the "pupil-reader" in helping to clear the seeming tangled skein of this complicated yet simple Spey throw.

Ars est celare artem; it's mighty easy when you know how.



CHAPTER IX

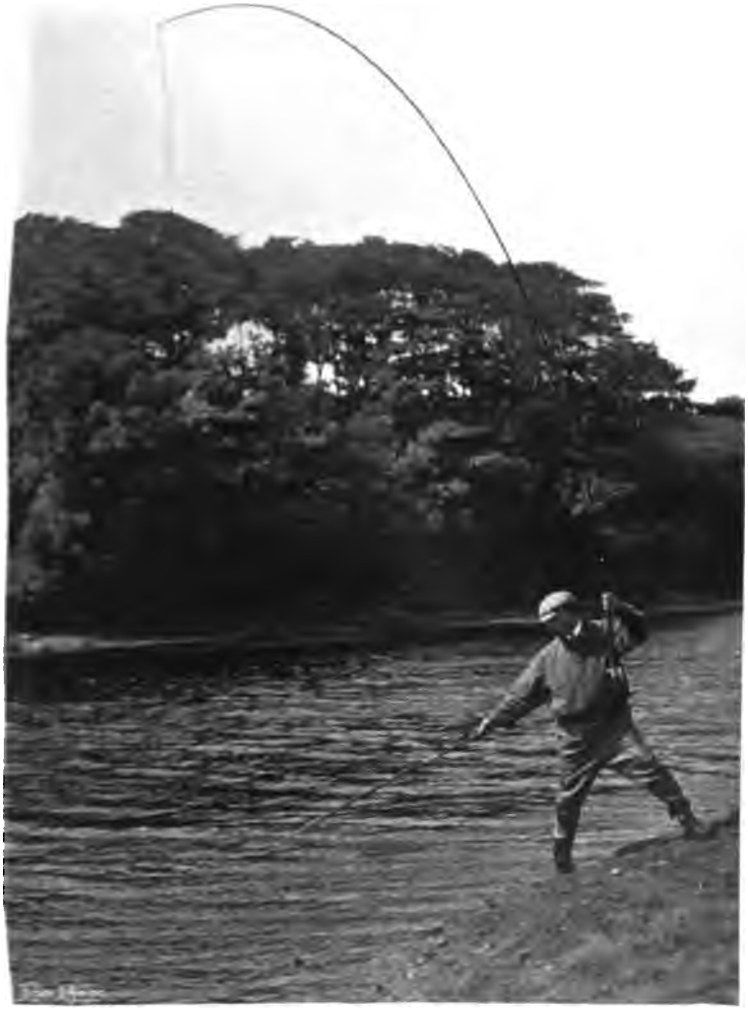
SALMON FISHING: PLAYING THE FISH

By John James Hardy

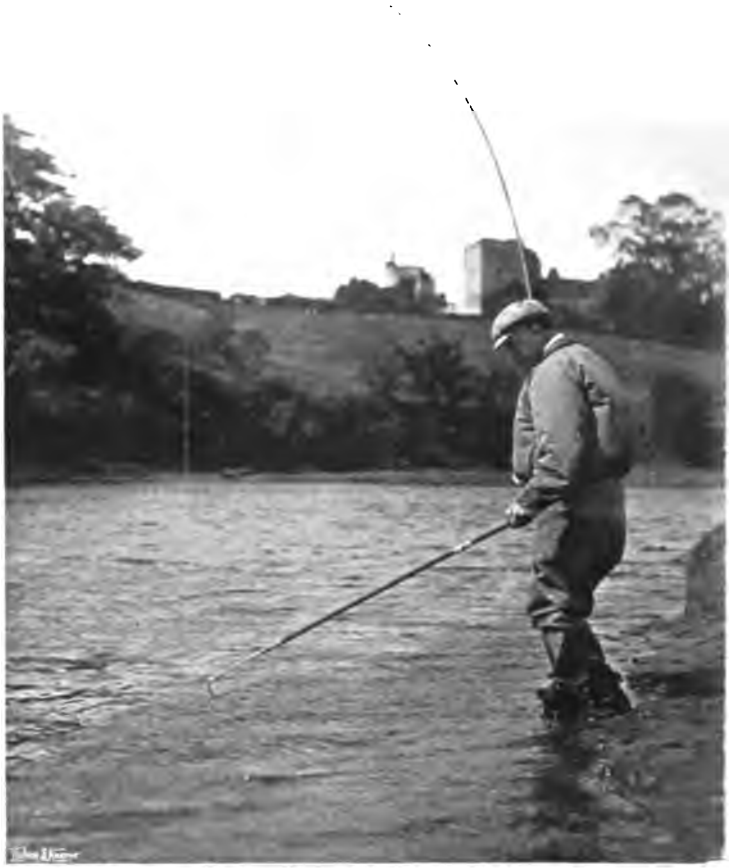
Hooking a fish is an act performed mostly by the fish itself. We fish with both hand and eye, and as we see the line straighten and feel the resistance we instinctively tighten and firmly pull the hook home. It is rarely that one sees the fish, but when this does occur one instinctively tightens on him. In most cases it would seem unnecessary to pull at all, as if the hook is in a soft part of the mouth it is home as soon as you feel the pull. It may be, however, that the point is in the roof of the mouth, or in some hard part, and it is probably safer to give a firm drag. In fishing deep slow water one often sees the movement of the water caused by the fish coming to the fly, and this generally causes inexperienced anglers to strike and pull the fly away from the fish. This inclination must be guarded against, and the hand kept down until the line is seen to straighten as the fish turns with the fly.

In playing the fly round at the finish of a cast the rod should never be allowed to point down stream, as if a fish rise when in this position, and the line is held between the fingers, the point may suddenly be pulled down and a break occur before you realise that you have had a rise. This, of course, does not apply if striking be done direct from the reel.

Playing a fish requires judgment, coolness, and a firm hand. It is this quality of coolness which enables a good angler to do his work so well. Steady is his hand; with his eye on the fish he carefully notes all the surroundings; sees that his reel is clear, where the dangerous rocks and snags are, and with this in his mind he gives his fish law when he dare, and no quarter when he dare not. It is bad form to be too lenient with a fish, and is better to be firm and force him to fight if you can, provided you have room. Keep a firm strain on, and as soon as he shows the white feather try conclusions with him. A sulky fish is always difficult to deal with. A handful of gravel thrown in, or



43.—CORRECT POSITION IN GAFFING A FISH.



34.—INCORRECT POSITION OF ROD IN GAFFING FISH.

tapping the butt, will often cause him to run. Other expedients, such as putting something on the line which will run down to him, are often useful. We have heard of a roll of twist tobacco being so used after other efforts had failed, and it moved the fish at once. In playing a fish which makes down a long pool, where you cannot follow, slacken line by switching forward some yards in the hope that this will float past him, and by pulling from below cause him to travel up into the pool again. It is seldom, however, that fish leave the pool if hooked in the mouth. A fish foul hooked, however, frequently makes down, and it is impossible to stop him. On the day of writing these notes the writer had an experience with a salmon not easily forgotten. Hooked in the Bridge Pool at Aboyne on the Dee, this fish went straight down, and although by running along the bank and giving slack, the pull on him was given from below, he never stopped, and both the writer and his ghillie had to take the water for over a quarter of a mile without waders before this plucky fish was gaffed, when he was found to be hooked in the tail. Of course there are occasions where a half-killed fish getting into a strong stream is carried down, or a fish foul hooked as shown will often bolt down, and unless you can follow it seems inevitable that he will be lost, the only chance being in some way to work him in to the side and so give the ghillie, who has stationed himself well below, a chance with the gaff as he passes.

The position of the rod after hooking a fish should be almost vertical at the butt, the pressure on the fish bringing the middle down to an angle of about 45 degrees. It is advisable to be opposite the fish as much as possible, and in a strong stream rather above. Allow no slack line between yourself and the fish, and have as little line in the water as possible, as if a fish runs far out and goes through a strong stream the slack line gets drowned and is likely to catch round a rock. Should this occur, get on the bank as high as you can and lift the rod up above your head with as much strain on as you dare, until the position is rectified.

Gaffing or netting a fish is generally performed by the ghillie, who, if he knows his work, requires no incentive to do his best, and may generally be trusted.

If fishing single-handed, however, gaffing is a matter requiring some caution in the handling of the rod. When bringing the fish close in, hold the rod away from the body to make the bend in the top as little acute as possible, and don't forget in the excitement of the moment that this is a position in which a rod is more likely to be broken than any other (see Plate 43). If possible the fish should be stranded and then gaffed through the belly or near the tail for preference, as a deep gaff mark in the shoulder is an ugly sight on the table. Where the edge of the stream is shallow, however, it is better not to use the gaff, as by keeping a firm strain on, the struggles of the fish will generally permit you to work him into shoal water, when he can be tailed.

CHAPTER X

SPINNING, PRAWNING, ETC., FOR SALMON

By John James Hardy

Spinning for salmon cannot be considered so artistic a method as fly-casting, and yet when carefully considered there is a vast similarity between the two. In either case it is a question of drawing a "lure" through the water, and whether it swims smoothly as in the case of the fly, or spins while swimming as in the case of the minnow, is of little consequence, as in effect both achieve the same object, with this difference, that the minnow will often prove effective on occasions when the fly will not, and *vice versâ*, and therefore we welcome this addition to the methods of angling for salmon.

The man who can afford to pass months on his river, and fish when he feels inclined, or only when the water suits perfectly for fly-casting, may elect to fish fly only as the pleasantest and simplest form of angling, and he is probably right; but the man who travels a long distance for a few days' fishing and finds the river in a condition utterly hopeless for fly-fishing, is naturally grateful that some other method has been developed which enables him to enjoy a form of angling which, however rightly it may take second rank to fly-casting, is an art requiring a great deal of practice, patience, and perseverance for its effective and perfect accomplishment.

The present methods of spinning for salmon date back but a few years, and one may now see casting rods, reels, and lines specially suitable for the work in use on rivers where, twenty years ago, anything in the nature of spinning was done with the fly-rod in a very primitive way, entailing great labour and producing little result. This was improved upon by the introduction of more suitable rods of about 14 feet in length, which in their turn gave place to rods of the present form and length.

The rod must be light and powerful, 11 feet 6 or 12 feet in length, but should not exceed this, as we must bear in mind that it must be held with one hand after making the cast to allow the free use of the other to attend to the reel and line. As in fly-casting, too stiff a rod is undesirable. It should have sufficient play in the butt to cast the bait softly and with ease in the desired direction. These rods are made of greenheart, cane, or cane built with steel centre, with firmly secured joints, and a properly arranged handle with the reel seat sufficiently far from the butt end, so that in winding the line there is no danger of catching any part of one's dress with the hands. Such a rod as that known as the "Murdoch" is eminently suitable. The first ring on the butt should be large, and have a hardened steel revolving centre (see Fig. 15, p. 140). The top-end ring is a most important item, and should be of very hard-tempered steel, working loosely in a sheath so constructed that the line cannot catch round it and get foul. The ordinary revolving top-ring used on fly-rods is not suitable, and the best form is that shown in Fig. 16. This, as will be seen, is a sort of pipe-ring, and is of such a shape that the line cannot foul it. The revolving steel centre part, however, is the most important feature, as it turns slowly round, and so prevents gutters being worn in it, which are so fatal to the lines. These two rings are so important, that we make no excuse for giving an illustration of them, showing their relative shape and size.

The intermediate rings we have seen made of porcelain and of very large diameter, but this is not advisable, as the larger the ring the more liable it is to get damaged, and porcelain is very apt to chip. If the rings be large enough to allow the line to work quite freely, nothing is gained by increasing the size beyond that measure, and for all practical purposes the "Bridge" rings as used on fly-rods, if of proper size, are much the best.

Their shape permits the line to travel freely, while they are not liable to get broken off or bent like an ordinary snake or upright ring.

For casting out the bait several methods are employed. One is to coil the line on the ground, and, holding it between the fingers near the reel, with about four feet of line hanging from the rod's point, to swing it until the desired momentum is attained, and then cast the bait in the desired direction, recovering it again by drawing in with the hand. This is called the "Thames'" style, and it is certainly a very easy one when standing on clean boards or in any place quite free from snags, which, however, is not often the case at the riverside. This style cannot, of course, be used while wading. We have seen this improved upon by an Irish dodge of carrying a tray strapped to the waist of the angler for the purpose of coiling the line on, to keep it clear of the water or ground. Both these methods, however, are apt to cause entanglement in casting; while if a fish be hooked, great trouble is always experienced before it can be got into touch with the reel. Both methods are bad, and therefore we must dismiss them in favour of casting direct from the reel, and recovering the line by winding in. The reel originally employed, and which is still in use by many anglers, is the "Nottingham." As, however, the drum requires to be controlled by the fingers, it is very difficult to learn, and requires constant practice to prevent over-running. A later form, known as the "Silex," is constructed on the "centre-pin" principle, arranged so that casting is very easy to learn, and over-running, the *bête noire* of the spinner, entirely avoided when the reel is properly used.

The line should be of plaited silk, on the vacuum oil dressed principle, to ensure its softness and pliability, and it should be thin. Too thick a line is quite unsuited for spinning, and one as thick as a trout fly line in the centre is sufficient.

The gut-trace (see Fig. 7, p. 87) is somewhat important. It should be 1½ yards long, and have at least three swivels, with an arrangement at the end to facilitate the changing of baits.

The artificial baits in use are many, and of various designs in shape and colour, and almost every season the ingenuity of tackle-makers adds something new to the list. Undoubtedly the two best are the "Phantom" and the "Devon," and these are largely used.

The illustration (Fig. 17) shows the ordinary "Phantom," which is better when weighted. A little difference of opinion exists as to whether the best place to have the lead is in the bait or on the trace, about eighteen inches from it. The general consensus of opinion, however, is in favour of the lead being in the bait, as it enables the cast to be performed more easily, and with greater precision. The weight should be the maximum which can be used safely in a moderate stream of four feet deep, so that additional leads can be added to the trace when desired.

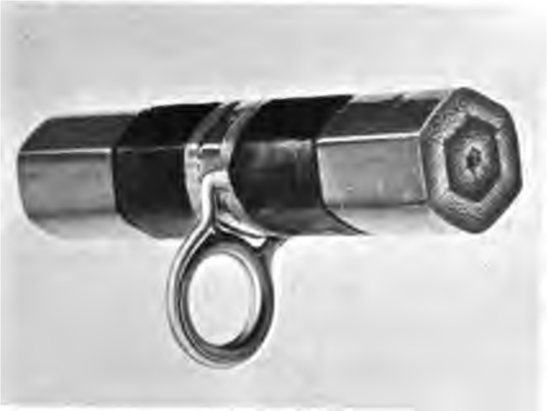


Fig. 15.—FIRST RING.

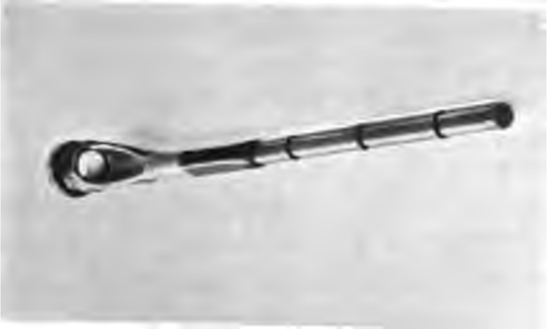


Fig. 16.—TOP RING.

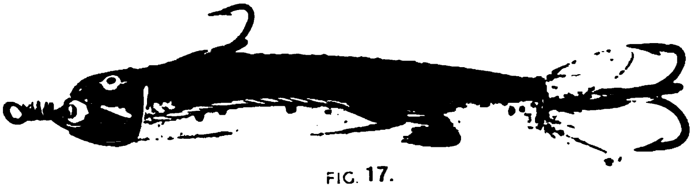


FIG. 17.

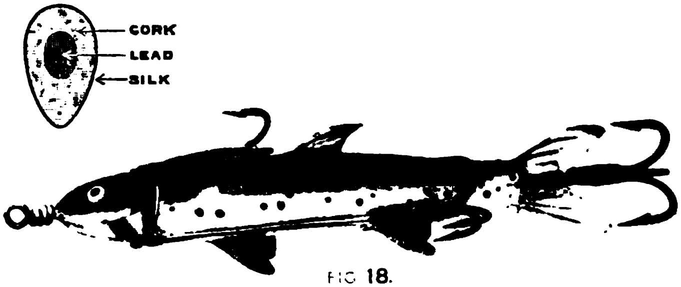


FIG. 18.

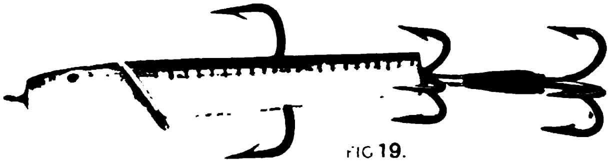


FIG. 19.

ARTIFICIAL BAITS.

A newer form of "Phantom" is called the "Ideal" (see Fig. 18). This has a lead in the centre of the body surrounded by cork, as illustrated, the idea being, that while this leading enables a cast to be easily and correctly made, the cork, by its buoyancy, prevents its too rapid sinking, and thus gives time to get the line taut before the bait can sink to the bottom, and get caught on the rocks. The utility of this arrangement seems fully established, as these baits are now much in use by spinners in preference to the ordinary "Phantom."

The illustration, Fig. 19, shows the newest form of the Devon minnow. The arrangement of the two large single hooks instead of the flying triangles is a decided improvement.

The devices for carrying and spinning natural baits are of great variety, and we only propose to mention those we have used and found effective. These are the "Dee" spinner, Figs. 20 and 21, the "Wobbler," Figs. 22 and 23, the "Crocodile," Figs. 24 and 25, and the "H.B.Dee," Figs. 26 and 27. The three former are well known to most anglers, while the latter is somewhat new.

To bait the Dee tackle the lead is removed from the flight, the loop-end of which, with the aid of a baiting-needle, is put into and through the bait from the vent. The loop is then passed through the lead, which is carefully inserted into the mouth of the bait, and worked down into position as shown in illustration. A piece of fine, soft copper wire is then fastened at the head and passed several times round the nose to make this quite secure, and then wound down the body firmly to support the belly and tie down the hooks.

This mount does not produce a brilliant spin but rather a slow motion. It is, however, attractive, and has proved a most useful and taking spinner, its only defect being that it is deficient in hooking, there being only the two trebles at the lower end of the bait's body, so that if a salmon takes the bait across the shoulder (as he often does), there is a great chance of his not being hooked, and we have seen this frequently occur.

The "Wobbler" is easily baited, as the spear is simply pushed into the body and bent to the required angle to give the desired amount of spin. The spikes on the hooks are then pushed in and tied down as shown in the illustration.

The "Crocodile" spinner (Figs. 24, 25) is a very simple and effective arrangement. The illustrations (which, however, do not show the latest form with the leaded spear referred to) show the tackle baited and unbaited. In baiting, the tackle is opened, and the fine end of the lead inserted into the mouth of the bait and pushed carefully home. The arms are then closed by pushing the leg at right angles through it, and bringing down the other, when the clips at the ends engage and make all secure. The hooks are then placed in position, and the spikes pushed into the bait, where they can be secured if necessary by a single turn of wire, but in the upper hooks this is not really necessary. The end triangle should, however, be lashed to the root of the tail. The spiked end of the lead should be in the centre of the solid flesh behind the belly, as this supports the end, while the arm which passes through a slot in the lead supports it in the centre.

This tackle produces a brilliant spin, which may be increased or decreased by bending the fans more or less acutely as desired. The hooks on the shoulder give it an advantage in hooking, and a fish is seldom missed with it.

The latest addition is called the "H.B.Dee" (Figs. 26, 27). This is baited by pushing in the lead as in the "Crocodile," but requires to be bound at the head and down the body in the same way as the Dee. The advantages of the tackle are that it can be made either to give a straight spin, or, by bending the leaded brass spear, to give a sort of combined spin and wobble, which is very attractive and killing.

Spoons are often used in spinning for salmon, but we have rarely seen them do much good, except when harling. It is true that an occasional fish is killed with them, but where this does occur the chances are that the angler would have done better with a phantom, and much better with a natural bait.

The range of flights or bait carriers here given, embracing as they do the fast spin as in the Crocodile, the slow spin as in the Dee, the spin and wobble as in the H.B.D., or the wobble pure and simple as with the "wobbler," admit of all shades of opinion being accommodated, and the vexed question of spin, wobble, or a combination, is left to the individual taste of the angler, who may choose for himself.

It is our impression that a salmon will rarely follow a bait that is travelling very fast away from him, nor will he take one which has not sufficient movement to be attractive and to disguise the hooks. We lately saw an angler kill four salmon on a battered old gudgeon, which had seen service the previous day. After landing the first fish this bait was accidentally trodden on, and yet mended up and killed three more fish. At the finish there was really more wire than bait. Such a bait would not have been used, but on this occasion it happened that the ghillie had forgotten the bait bottle, and it was the only one available. Where its deadliness came in, however, was that it was presented by an angler who knew every stone in the river, and who is a most successful spinner. The water, too, was heavy and discoloured, and the day dull, which naturally assisted him.

Casting out the bait a long distance, while desirable on particular occasions, is by no means a necessity. A moderate length of line, which barely covers the lie of the fish, is sufficient, but the "crux" of the whole thing lies in the manner of the spinning. The pace at which the bait travels across the current, and the depth to which it is allowed to sink, are all important.

The most deadly method is to cast almost at

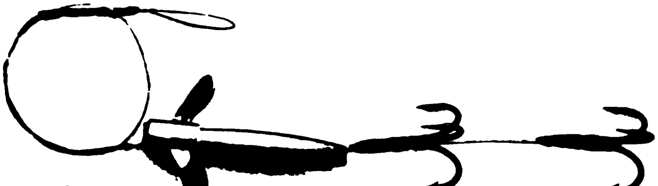


FIG. 20.

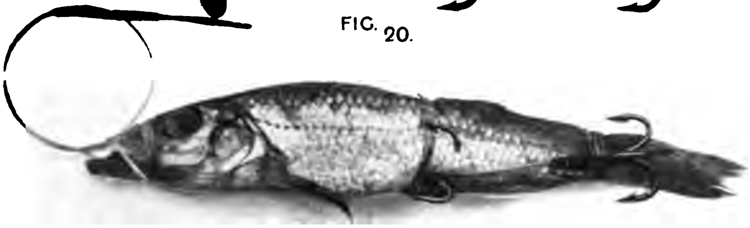


FIG. 21

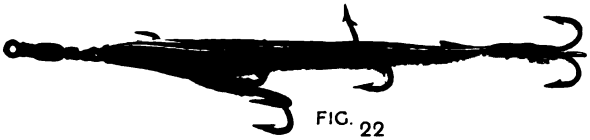


FIG. 22

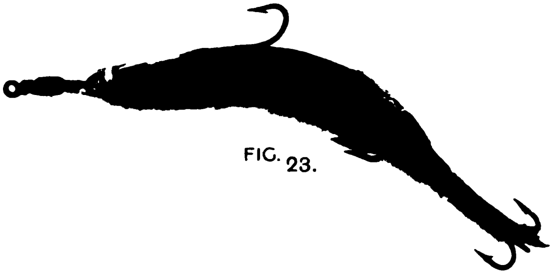


FIG. 23.

NATURAL BAIT SPINNERS.

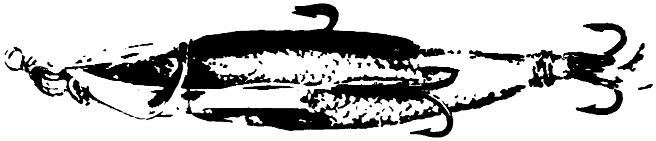


FIG. 24

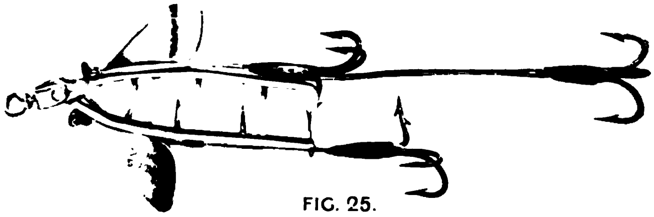


FIG. 25.

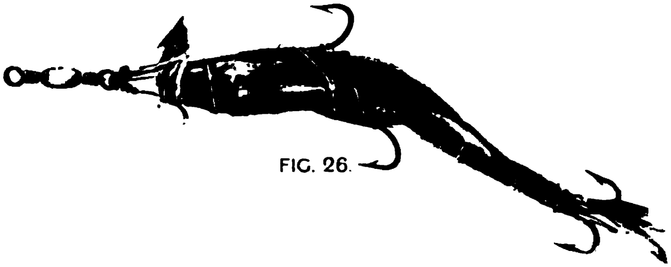


FIG. 26.

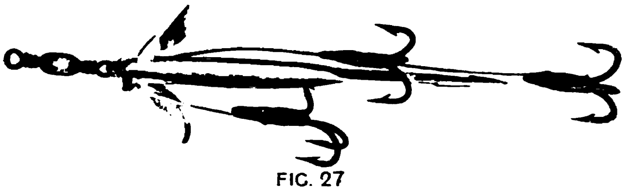


FIG. 27

NATURAL BAIT SPINNERS.

right angles to the stream, and, without winding in but simply keeping the line taut, allow the bait to come as slowly round as it will without catching the bottom. A little movement may be given to it by tugging the line with the right hand (see p. 151), pulling back about six inches and then letting it go again, or moving the top of the rod smartly as if thrashing the water. We have often watched a bait so treated for the purpose of ascertaining the effect of this tugging or wobbling of the rod, and it appears to have but little. It is questionable whether the rod held quite still until the bait has completed its circuit is not equally good. We have worked the bait both ways, and both have proved effective, but we must confess to a fondness for the tugging. At any rate it serves to keep one employed.

Having in a rambling way briefly described the rod, reel, and tackle for spinning, we must now try to give some definite instructions as to how to use them. In the first place, it is necessary to be able to cast either from the right side or from the left, so as to command a river from both banks.

In casting from the left bank the right hand should grasp the rod above the reel, with the left below, and in such a position that the forefinger commands the lever of the automatic presser brake shown in diagram (Fig. 28). As the reel is here the most important factor, it is necessary to give more clearly a description of its working parts. The problem of a perfect casting reel is one of the most difficult ever set before a manufacturer. The conditions to be fulfilled are that the drum must revolve freely as the line is paid off in making the cast. It must be under automatic command, and require no finger manipulation to cause it to stop when the bait has reached its destination. The "Silex" reel fulfils these conditions, as it is fitted with a self-acting brake which can be regulated to the greatest nicety.

A point of great importance is the little screw (K) at the side. In the head of this there is a slot, so that it can be turned with a coin. When the bait is mounted and all is ready for work this screw is used to regulate the pressure of the brake on the spool, according to the weight of the bait to be used, and this may be estimated by the bait (when the rod is held up), just moving the spool slightly by its own weight, so that when the cast has been made and the bait ceases to draw line, the revolution of the reel stops at the same instant. If it does not, slack line or over-running may ensue.

To make a cast, the line must be reeled up until not more than 1½ yards hangs from the rod's point. The position is shown in picture, p. 148. The body must be turned half round, until you can look back and see your bait behind you, then with a curved sweep upwards the bait should be lifted into the air and cast in the direction desired, the rod pointing in the same direction.

This cast must be performed by a rather slow swing, but it must be quite underhand. There must be no mistake about this *underhand*. No other method

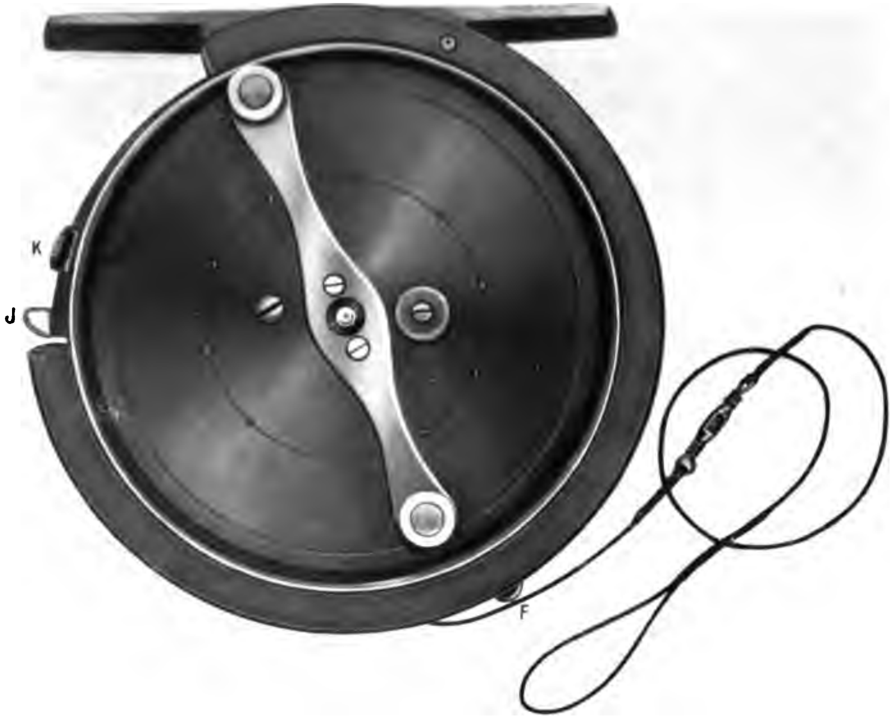
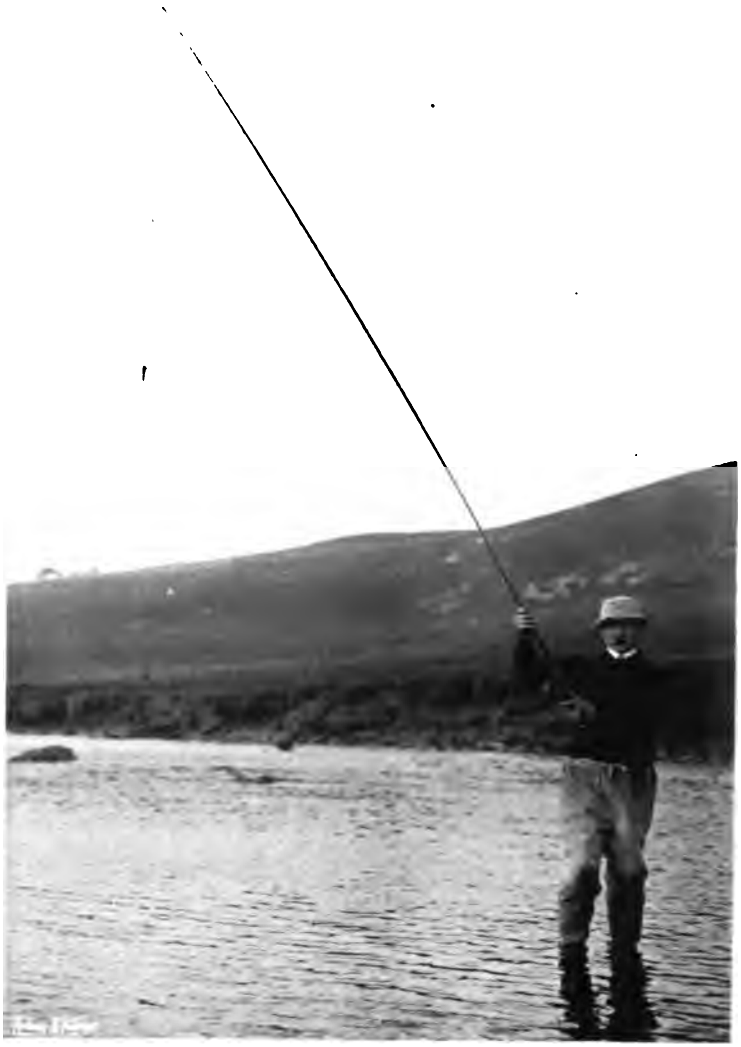


Fig. 28.—THE "SILEX" REEL.



45.—READY TO CAST.

should be attempted until this is thoroughly mastered. The only other cast which can be made is the horizontal. The automatic presser should be eased with the forefinger of the left hand by pulling it slightly back for an instant as the cast is started. The finger, however, must release it instantly, and before the bait has travelled more than half-way. If this be not done you must not be surprised if you get into a *beautiful* tangle through over-running. The easy way in which this reel will *sling* out a bait long distances without the slightest fear of trouble (if intelligently used), must be the excuse for being so emphatic in these instructions. Remember, no great force is required. The pictures, p. 148, clearly show the movement of the body from the commencement to the finish of the cast.

After the cast has been made, the right hand is in position to work the line, and generally manipulate the reel in winding and throwing on the check when a fish is struck, &c. In casting from the right bank the left hand should be the forward or casting hand.

In winding the line it should not be gripped between the fingers, but merely guided to get it to run level on to the drum.

In making a cast the proper place for the bait to fall is about twenty degrees, measured from a line drawn at right angles across the stream.

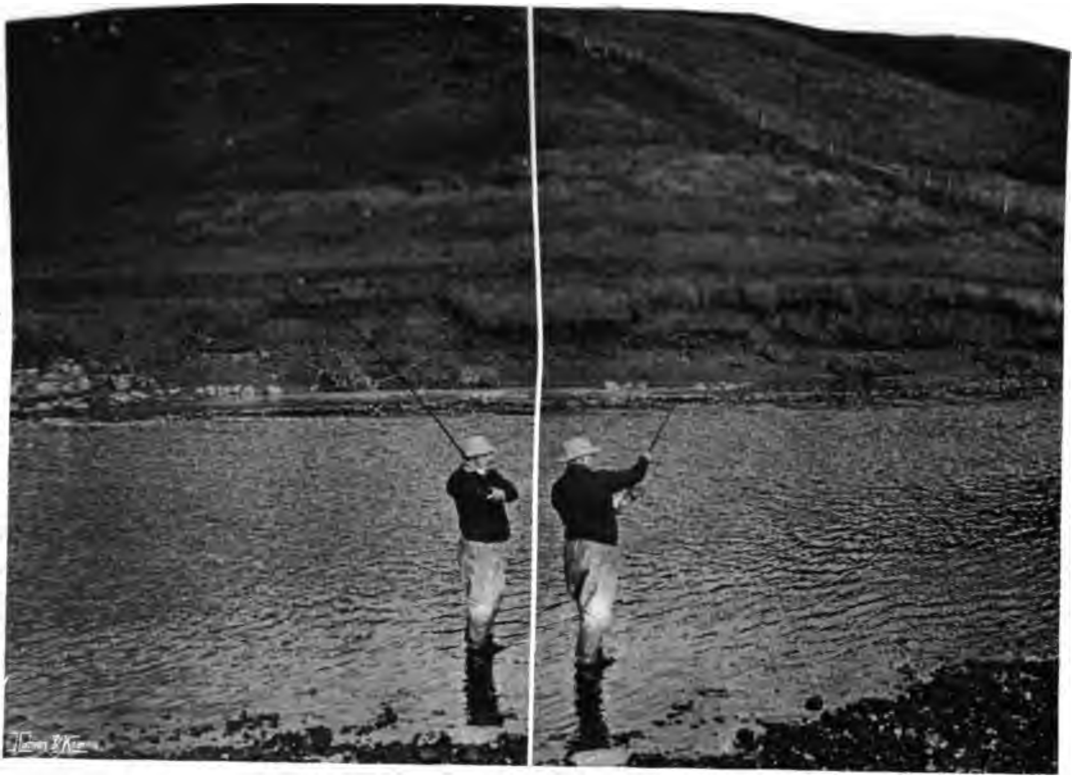
To work a pool properly it is necessary to know its depth, and the conformation of the bottom (as far as possible), so as to enable you to give the correct speed, and to keep clear of rocks, &c. In any case it is best to spin rather slow than fast, even at the risk of getting hitched up on the bottom. If the pool vary much in depth it is necessary to alter the weight on the trace by adding a little where it is deep. There are several kinds of leads which are easily fixed or removed, and a few of these should be carried in the pocket to be handy when wanted.

In striking a fish much will depend on the distance he is from you, but, as a rule, the fish hook themselves, and it only remains to remember that stout triangle hooks, at say 20 yards, require a fair good pull to get them well home.

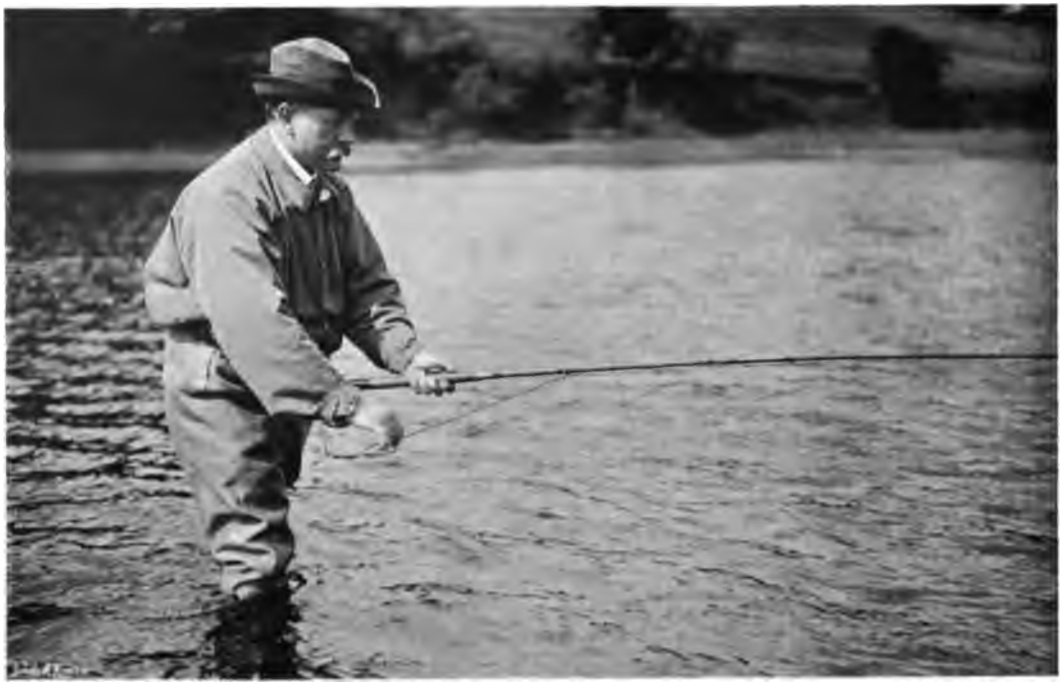
In spinning shallow water there is always a chance of catching the rocks or bottom, particularly if your bait falls at right angles to you, in which case the stream bags the line and carries the bait quickly down. Should the bait pitch too far back it is better to snatch the line, and draw it all back with the hand; then reel up and make a fresh cast.

In case of "touching" as the bait sweeps round, feel it gently with the hand, and, if it be not a fish, shake the rod point gently, when it will generally clear. Should it get fast, however, get below as far as you can and pull. Should that not succeed, make a ring round the line with a hazel or other twig, and throw this out beyond where you think the bait is caught. When this has drifted down stream below it, snatch it vigorously.

Spinning may be practised in almost all places



46.—MAKING THE CAST.



47 FISHING OUT THE CAST.

where fish are known to lie, and in almost all heights of water, provided you alter the size of the bait and the weight of the tackle to suit the varying circumstances. A moderately high water is most suitable, and spring and autumn are the most killing times. In summer the baits should be small, as, for some reason, salmon do not then take a large bait well.

It is a common fallacy to believe that salmon cannot be killed in a rising river, say, after it has risen six inches, and fish are running. At this time it is always worth while to put up a good-sized gudgeon, and fish it in the back eddies at the head of the pools just where the fish rest before taking the stream.

PRAWNING.

The prawn undoubtedly forms part of the natural food of the salmon when in the sea, and is a diet for which he shows a decided preference, if we may judge by the free manner he will often take it when presented to him in the river. Of all deadly baits which may be used for salmon fishing the prawn has the precedence. Salmon will take it in all states of the water, whether high or low, dark or clear. In summer, when the water is very low and clear, it is often the only bait which can be successfully used.

Prawns are preserved in the following manner. Boil in strong salt and water, to which has been added a little saltpetre to give brilliancy of colour. When they turn red they are sufficiently cooked, and should then be dried and placed in glass jars, covered with glycerine, and the jars firmly corked. They are also preserved in their natural colour simply by salting well and packing closely. Why we should make them red, when in their natural state they are not so, is a question difficult to answer, and it may be that they are better unboiled and simply salted. In any case many prefer them preserved in this manner, as they are tougher.

Prawns have a strong smell, and this to a large extent is their attraction to the fish. If a prawn be let down into a pool among salmon it generally causes them to move, and they will often rush about in a very wild manner, even though they will not take it. Salmon take a prawn in a variety of moods, sometimes quite savagely, and at others quite gently, as though they feared to hurt it.

The same rod, reel, line, and trace as described for spinning are suitable. The trace must be leaded to suit the current and depth of the pool, and altered as circumstances seem to require.

In moderately full water, or whenever possible, it is better to use a tackle well armed with trebles. The illustrations show two which are good for general use. In very fine water, however, it is sometimes necessary to use a single treble, passing the gut through the prawn from the head to the tail with a baiting needle, and drawing the hook close up among the feelers. This is the method generally used for shrimp.

The prawn may be fished in a variety of ways, but the most general is that explained in spinning (p. 145), *i.e.* by casting out at an angle across and down stream and allowing the bait to work down and across. In doing this, however, it is advisable, if the current be at all strong, to pay off a little line with the hand in order to keep the bait well down, to allow it to work more slowly round. A prawn should never be hurried in this kind of fishing. The more gently you can work the better, so long as you keep in touch with it.

A method we first saw employed in a very deep pool in Norway, and which at that time accounted for fish of 35 lbs. and upwards, was to stand on a rock overhanging the pool and fish with a small lead on the belly of the prawn and a large one about three feet from it. The bait was cast well up into the run and allowed to travel down as deep as possible and very slowly moving (about six inches at a time) with a sink and draw motion. Since that time we have often employed the same method successfully in deep pools. A plan which is now coming much into use is to place a fairly large float on the line, with the trace sufficiently weighted to hang plumb, and allow it to swim down the pool by paying off line in the manner called by Thames fishermen "trotting." In very fine water the prawn may be used on a large single hook passed in under the tail and worked out under the throat. The trace should be leaded lightly about fifteen inches from the bait. Then, wading up stream, it should be cast from a few yards of slack line held in the left hand, rather over the stream into the quieter water, and allowed to work down in the same manner as the "tumbling minnow" in trout fishing.

But there is no end to the methods to be employed, and all may be resorted to as occasion may seem to warrant. The advantage of this last-mentioned, however, lies in the fact that in low water you do not disturb the fish until he has seen the bait.

In a pool with a deep current running between rocks, which can be commanded from above, it is a good plan to let the prawn down into the stream and pay off line (about a foot at a time) slowly, at the same time working the rod in a sink and draw method.

It is often a puzzle to know how so large a fish as a salmon can nip a piece out of the back of a prawn, as clean as if done with a knife, between three sets of triangles when it is travelling across stream, and not get hooked, but the prawner will have this occur again and again. He never has a chance to strike; he only feels a slight pluck and the damage is done.

To bait a prawn tackle neatly requires some time and care, and it is advisable to bait three or four tackles before going out fishing. These should be wrapped up in waxed paper and packed in a suitable box, which will also carry six extra prawns. This method is better than carrying them in a clumsy bottle. Should they not have been used they can be returned to the bottle again. The mounted tackles, if kept moist, will remain sweet for some days.

Fig. 29 shows what is called the "97 prawn tackle," baited and unbaited. To bait this tackle the needle is inserted under the tail of the bait and brought out under the head, and its point passed

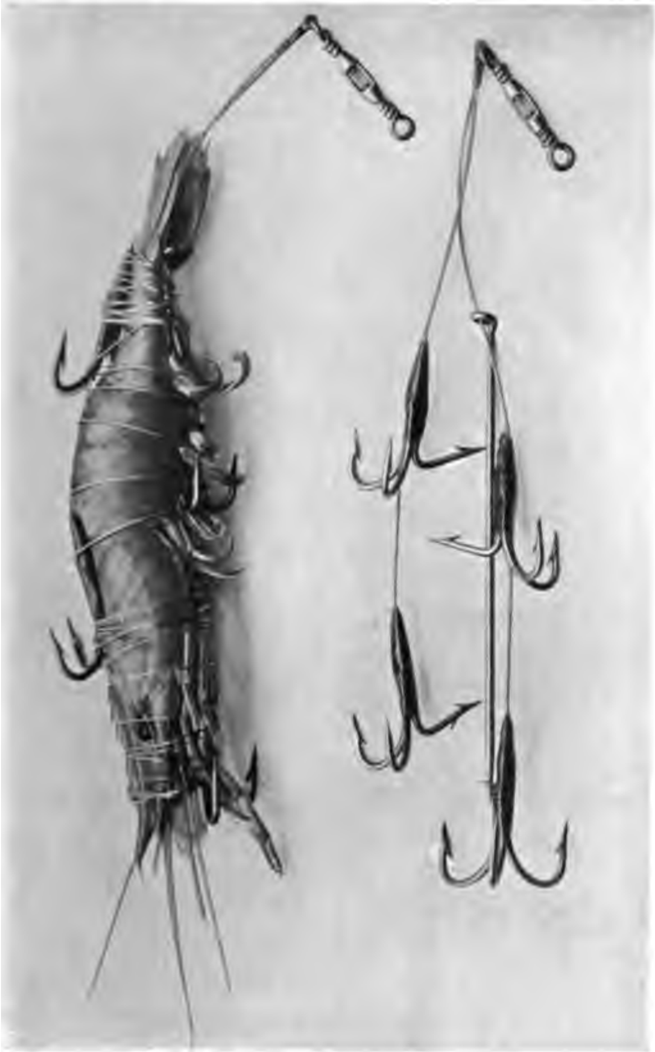


Fig. 29.—"97" PRAWN TACKLE.

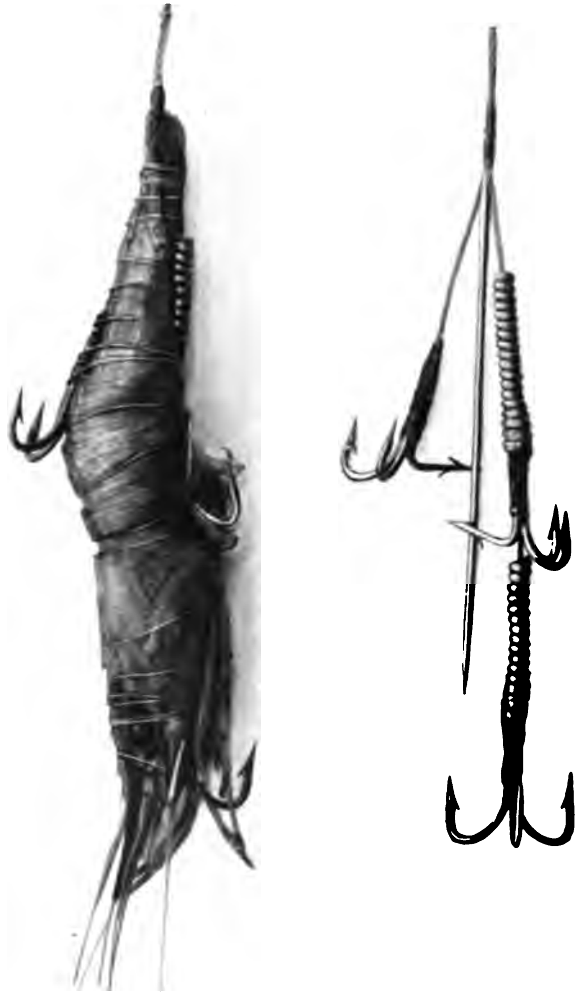


Fig. 30.—LEADED PRAWN TACKLE.

through the little loop on the end triangle. The spiked hooks are then pushed in as shown, and all made fast with fine soft copper wire. This is a tackle much used and is very certain in hooking.

Fig. 30 shows a later form *leaded.* The manner of baiting is to push the needle in under the tail, and arrange the hooks as shown, care being taken to hide the lead as much as possible, and then tie down with wire. The lead keeps the bait on an even keel, and in fine water is sufficient to sink it.

WORM FISHING.

This is the last resort of the salmon fisher, and only under exceptional circumstances can it be justified, such as, for instance, a small sluggish river, where fly fishing is useless; or when fishing some distant river, with nothing else to employ one's time, and the river dead low.

The general mode of baiting the worm is to have a large salmon hook, 4/0 to 6/0, tied with some stiff short bristles on the back of it. Large worms are procured, and one is put on by inserting the hook about an inch from the head. This is threaded up the gut, then follows another in the same manner, and lastly one is put on to cover the hook, and the others drawn down to it. This leaves six ends wriggling, and is very attractive.

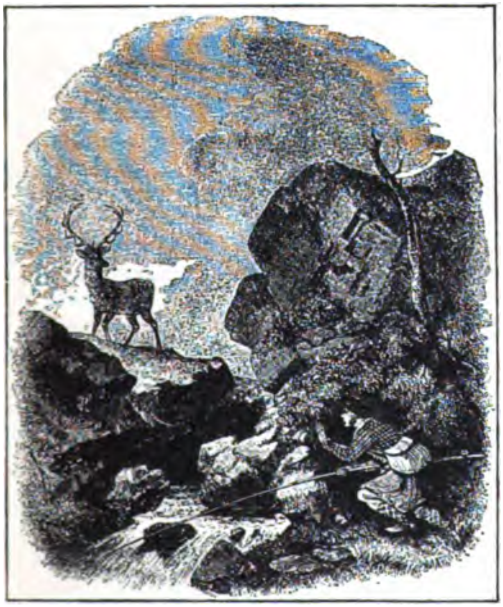
Another method is to have a two-hook tackle, one hook above the other, size about 2/0, and on this to put two large worms by passing the top hook through below the head, and the bottom one towards the tail.

Lead, in some form, must be used on the trace, about eighteen inches from the bait. The method of fishing is to draw off from the reel, say, three to five yards of slack line, and cast into the edge of the stream well above where you are standing, and allow the bait to travel down below, when it should be lifted and recast. If anything is felt to stop the bait, gently tighten the line, when, if it does not move, give it a little shake to free it. If, however, it should prove to be a fish, which you will know by the movement, give him a few seconds before striking.

WADING.

A word of caution may not be amiss on this subject. In a stream never wade above the fork. Observe the surroundings carefully, and if the pool is unknown to you feel cautiously with your feet as you go on. Shuffle rather than step. Do not go far down a stream where, in order to get out again, it is necessary to wade up stream to the point at which you entered; and for this reason, that while it is easy to go with the current it is more difficult to force your way against it. If by any chance you find the stream is too strong to wade against, turn sideways to it, and press your feet hard down, and move a few inches at a time until the danger is passed. In quiet, deep-running pools you may wade until your elbows touch the water. An excellent wading staff and gaff is made, which can be carried in the left hand, until the desired position is attained, and, being heavily shod with iron, can be passed behind the left leg, and will remain there held by the shoulder strap until wanted to move again. Such a staff is invaluable to elderly men, or indeed to any one who has rough wading to do, as it practically comes in as a third leg and gives great confidence.

Where the bottom is covered with slippery stones it is well to have some good sharp ice nails in the soles of the brogues. The comparatively light shoe brogues are pleasant for easy wading, but for streams with rough bottoms good thick leather boots, that give a strong support to the ankle, are much to be preferred.



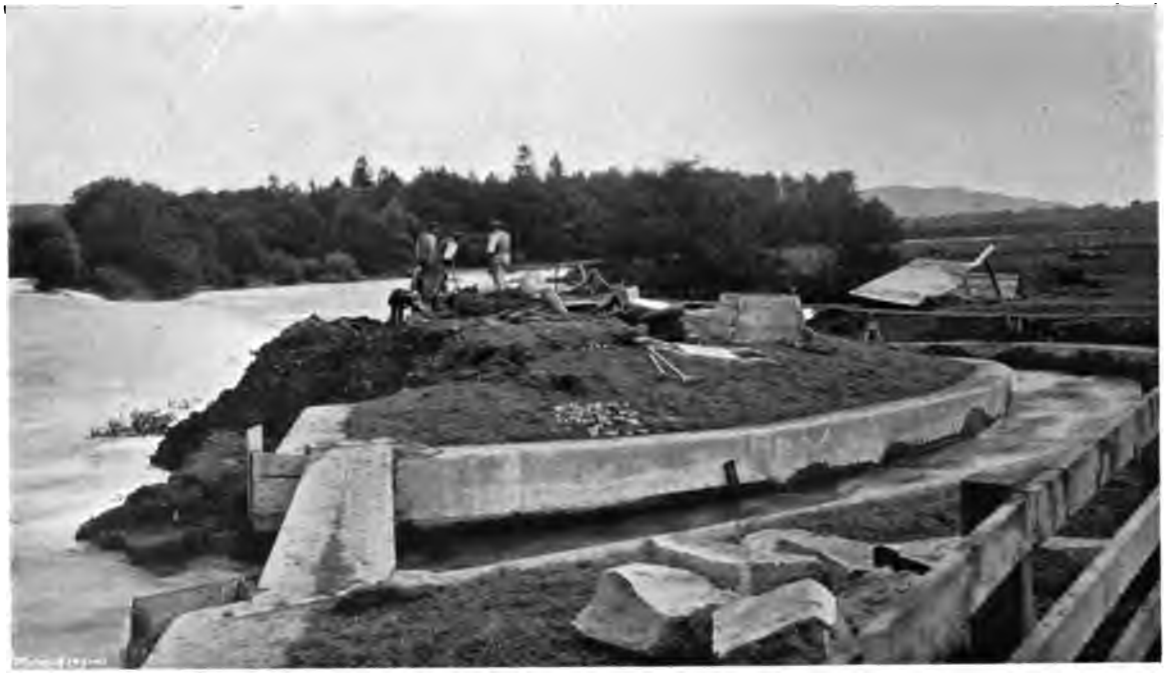
CHAPTER XI

THE MAKING OF SALMON PASSES

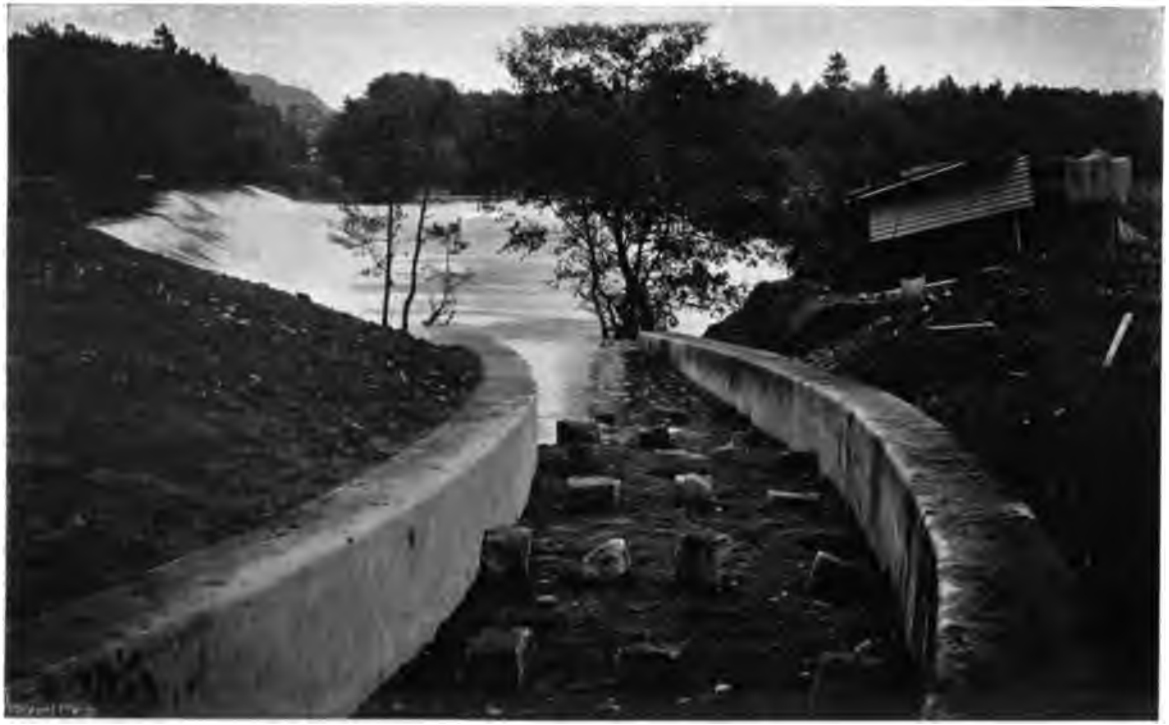
By the Editor

"When as the salmon seeks a fresher stream to find
(Which hither from the sea comes yearly by his kind,
As he in season grows), and stems the wat'ry tract,
Where Tivy falling down doth make a cataract,
Forc'd by the rising rocks that there her course oppose,
As though within their bounds they meant her to inclose;
Here, where the labouring fish doth at the foot arrive,
And finds that by his strength but vainly he doth strive,
His tail takes in his teeth; and bending like a bow,
That's to the compass drawn, aloft himself doth throw;
Then springing out its height, as doth a little wand,
That bended end to end, and flirted from the hand,
Far off itself doth cast; so doth the salmon vaut,
And if at first he fail, his second summersaut
He instantly assays; and from his nimble ring,
Still yerking, never leaves, until himself he fling
Above the streamful top of the surrounded heap."
—Drayton.

The literature of salmon passes is quite extensive. It is to be found in various reports of the fishery inspectors, by Mr. Frank Buckland, Mr. Ffennell,



48.—LUPPLIN DYKE: SHOWING INTAKE AND SHAPE OF PASS.



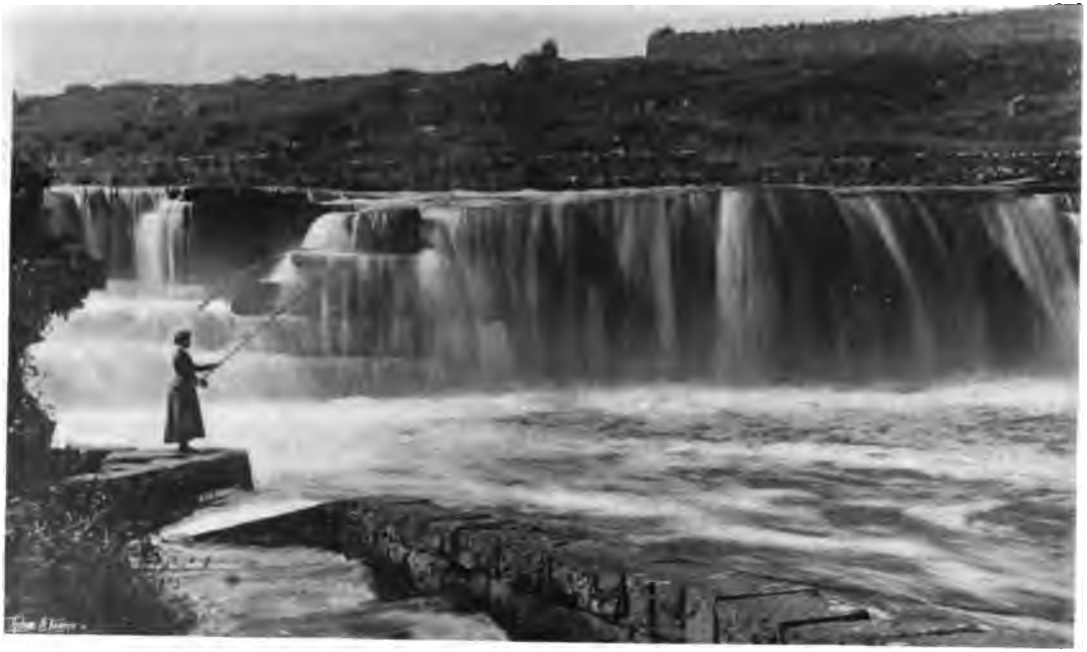
49. DUPPLIN DYKE: PORTION OF PASS AND DYKE.

Sir Spencer Walpole, and others, in certain volumes, notably Vols. II. and XIII. of the Fisheries Exhibition Literature, in such works on fish in general as Couch's "British Fishes," and many others—in an extent and variety sufficiently testifying to the difficulty of the subject, and to the existent difference of opinion as to the manner in which an invitation to "step upstairs" may best be offered to the fish who have their dining-rooms down in the big sea and their nurseries up in the little rivulets. This, of course, is the problem that all these mechanical devices set themselves to solve—the best way of providing the fish with means of ascent over falls of water too steep or too high for them to climb without some such assistance. The salmon's power of ascending a straight descending sheet of water, or one rushing with violence down a considerable gradient, is very remarkable, but it has its limits. It is impossible to state the force, volume, speed, and gradient of descending water that a fish in moderate condition for such athletic sports can fairly be expected to face with success, but the height of sheer fall that such a fish can negotiate may easily be observed. We hear much loose talk about the height that salmon can leap, and perhaps imagine that we have seen fish jump much greater heights than they would prove to be if measured, but Sir Spencer Walpole, who was for many years associated with the late Mr. Frank Buckland as inspector of salmon fisheries, assures me that after repeated observation a measured five feet ten inches of sheer fall is the highest that he has ever seen a fish ascend, and this at a moment when hundreds of fish were "doing their level best" to get up to the nursery ground. One or two especially good jumpers succeeded. We have to remember, however, that those who thus ascended were, without doubt, the fish in most active condition, that the object of fish ascending rivers is to propagate their kind, that a large proportion of them are heavy with spawn, and that, therefore, it is exceedingly unlikely that any number of them would be able to leap nearly as high as this.

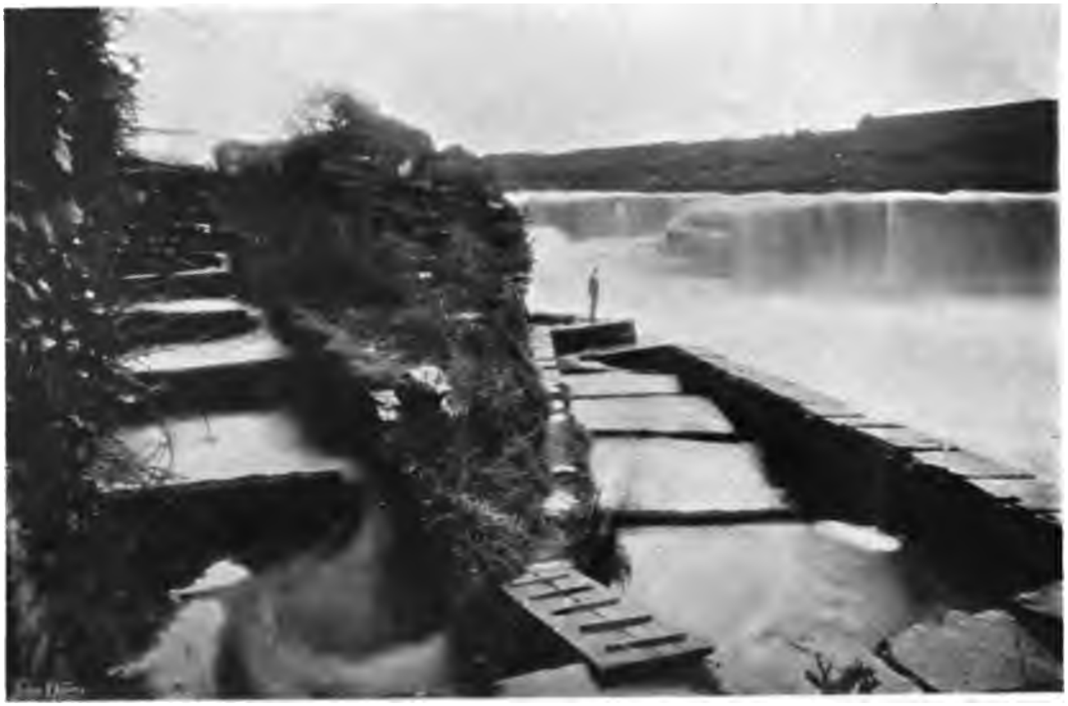
In taking a survey of the whole subject it is convenient to chop it up into sections. Thus, there are two distinct ways in which the fish may get up a fall, by jumping a sheer descending wall of water, or by rushing up through a stream coming down at a gradient. Of the obstacles to the ascent we may make a division into two kinds, natural falls and artificial obstructions caused by dams and weirs and so on, usually for the purpose of diverting a sufficient head of water to work a mill wheel. The artificial obstructions, the weirs, we may again subdivide into those that have a perpendicular fall and those that are built at a slope.

Fifty years hence there is little doubt that what we are pleased to call to-day our knowledge of salmon will be regarded as purely legendary. It is at least quite certain that a good deal of what our fathers of half-a-century back considered their knowledge of salmon had not emerged from the legendary phase, according to our estimate. Before considering the means that have been evolved by repeated experiment for helping fish to ascend the obstacles that we have indicated just above, it may be amusing to have a look at the statements published in print (which cannot lie) about the abilities of salmon in respect of ascending falls, and the methods in which they performed the athletic exercises ascribed to them. We know that our imaginative fathers used to believe that the snipe helped himself to rise by giving himself a jump into the air from the end of his long bill. It would be no surprise to us at all to learn that they supposed the salmon to have some means of elongating a fin in order to use it as a jumping pole in aid of its high jumping. What they did suppose is scarcely less remarkable, namely, that the salmon, to give itself a good spring, and to aid the powers of its tail in propelling it into the air, was in the habit of taking its tail in its mouth preparatory to leaping, so that at the uncoiling it should have all the more power. It is a pretty notion. It is given, as seen above, by the poet Drayton. To be sure a good measure of licence is to be permitted to poets—we all know what Plato thought of them, and he was a wise man; but still there is no doubt at all that in detailing us this achievement of the salmon, which sounds like an anticipation of some scene in Alice's Wonderland, he was expressing the common belief of the day. He did not regard it as a fiction at all, still less purposely invent it. It was part of the salmon lore of our forefathers. No wonder they believed no obstacle sufficient to stop a fish if he really meant getting up it; and the wonder is, rather, that the earliest made passes were so good as they were—in general a deal better than a great many since made by those who had not only past failures, but also past successes, to guide them.

The first form in which we come across any kind of pass is that to which the name is applied of the Forsyth fish-ladder. Who the genius for mis-naming was that first applied the term of "ladder" to these stairways, we do not know, but it is singularly misleading, and it is very curious how tamely successive writers on the subject have continued to use the misleading name. The essential meaning of a ladder is a means of ascent with side pieces and rungs, either round or flat, but with the rungs not resting up against a solid backing. It is this absence of the solid backing that typically distinguishes a ladder from a stairway. The so-called fish-ladder has this solid backing, and is therefore rightly to be called a stairway, and not a ladder at all. The latter term has misled many, who know nothing about the business, and innocent people ask you how it is possible for a fish to balance itself on the steps of a ladder, and spring from one step to the next step. Doesn't it sometimes "slip through"? and so on—all this, because it has pleased somebody to call a thing a ladder that has none of the essential qualities (so to call them) of a ladder, and because other writers have followed



50—BALLISODARE FALLS.



51. BALLISODARE PASS

this same body like domestic sheep. One of the early Forsyth "ladders," really steps or stairways, was put up on the falls of Conway, and it differed from an ordinary stairway only in this that the stops did not extend horizontally all the way from the one side to the other, but left a gap, alternately at the right end of one stop, and at the left end of the next, and so on, where the water could run down on the inclined plane. The stops were made of vertical planks, breaking the force of the water. The effect of this was that the water came down in a serpentine course, and the idea was that the fish should go up in the like snaky manner. The fishery inspectors, in their report of 1863, write of this "ladder" as follows:—"On the Conway proper, the greater proportion of the breeding ground was lost, shut up by the falls of Conway. These falls are 28 feet high, and a pass or ladder has this year been constructed over them, by two gentlemen owning water above, upon plans most kindly drawn and furnished by Mr. Forsyth, C.E., of Board of Public Works in Ireland. The work will, for long, probably be the most remarkable of its kind constructed in England, and will, no doubt, be as great an object of curiosity and interest as it promises to be of utility."

This is pretty "tall" writing, so tall that it raises a delicate suspicion at once, even as does the tale of a very tall fish leap. Perhaps it is sufficient, by way of commentary on this work which will "for long, probably, be the most remarkable of its kind," &c.,

to quote the gentle criticism on this same pass contained in the seventh annual report (five years later) of these officials' successors, the criticising official in this instance being the late Mr. Frank Buckland: "Many miles of spawning ground are cut off from this river (the Conway) by the well-known Conway Falls. Immediately on arriving at this district, I proceeded to examine the ladder lately erected there, and regret exceedingly to have to report that in my opinion it is utterly useless. It is so exceedingly steep that it is perfectly impossible for fish to get up it, the steps are too narrow, and when the water is low the fish have to jump about two feet six to get into the entrance."

At the end of their report of that year we find the inspectors generally condemning the Forsyth "Government ladders," which the Government had put up on many rivers, as carrying either too much water, so that the fish were hurled back by the stream, or too little, so that they had not enough to swim in, or as being too steep, or as having their foot in the wrong place—*i.e.* not in the place where fish naturally congregated when trying to ascend.

Although this kind of "ladder," so mis-called, is associated with the name of Forsyth, the first pass ever built on this plan was as far back as 1827, by a Mr. Smith, at Deanstone. I understand that it was built at the same time as the dam itself, and even so must have been costly. Dam and pass together are said to have cost more than £1000. It is on the magnificent scale, unnecessarily magnificent, but it is very successful. It is successful because it is at a light gradient, and because it is large enough for the fish to have freedom of movement in it; but as I gather from Mr. Buckland's report it was not at first successful. He says—"The space of about ten feet nearest certain flood-gates was lowered about thirteen inches, with the idea of deepening the water for the passage of the fish. It was soon found that no fish could stem the current for more than about one-third of its distance, and the accident of an observer placing stones in the current, on which he might stand to watch the fish, gave the hint of creating resting places for the fish."

In order to make the Forsyth "ladders" suitable for the passage of fish Mr. Buckland suggests, where the passage is short and not too steep, to remove the stops altogether, or where the ascent is steep and the rush of water violent, to prolong the stops right across from side to side, so as to make a series of small pools.

All this has been more or less of a glance back into history; but besides its historical interest, if it have any, it is not without value, which all history ought to have, in squeezing out practical hints, both from the failures and successes of the past. One point which we may see clearly is that the Government failed in their general adoption of a principle that was only suited to certain circumstances. The Forsyth "ladder" answered under the conditions at Deanstone, and it answered also in the Ballisodare river in Co. Sligo, an instance that will be fully discussed later; they concluded therefore that it would answer everywhere and under quite different conditions. From the failure of these ladders in many places the conclusion was drawn, which holds good to-day, that no one form is best suited for every place and every fall, but that each obstacle must be considered on its own merits. The difference, for the present purpose, between a natural obstacle and an artificial one, practically comes to this, that the artificial one is commonly made for the purpose of conserving the water at a certain height in a mill or other stream, so that though the simplest remedy for the evil that it presents in preventing the run of salmon would be to cut a gap through it, at its middle, of such dimensions that the water just at that point would be of the height and strength that would accommodate a running fish. Such a cutting would, by the deepening of the water, defeat, so far, part of the object for which the dam was built. If, however, the weir be raised at the sides, say, instead of lowered in the middle, the same objection does not apply, and there are cases in which this simple plan may succeed. From the point of view of the weir-maker it is only just to say that such a concentrated rush of water requires the best possible construction and foundation to withstand it. There is an obvious advantage in inducing the salmon to run, if possible, up the middle of the weir, because they are not nearly so liable to be poached in that situation as when they run up close to the side.

It is necessary that the foot of the pass should come down into the place whence the fish will naturally seek to ascend; but this is not to say that this place is fixed, and that you cannot alter it. If the effect of making your pass is to form a current impinging into a certain place below the obstacle so strongly that it becomes the chief or predominant current—the swiftest and strongest—of the stream, then the fish will be led to that point for attempting the ascent, although previously to the making of the pass their tendency might have been to congregate at some quite different place for the ascent.

Where your obstacle is a natural one, like the falls of Dupplin, for instance, there may be no reason why, provided that the foot of the pass comes down into the place where the fish naturally gather, the head should not be as far as you please up above the fall. You may make the incline as gentle as you like. It becomes practically a matter of expense in the first place, and of risk of exposing the fish to poaching in the second; but granted that the first is no object, and that you can watch the pass effectively, it ought to be the most useful and simple contrivance of any. Its construction can very easily be seen from the pictures. If this Dupplin pass has a fault it is that it is too deep in parts, tempting fish to lie there, and so be rather liable to the attacks of poachers; but we are told that fish often do run through it quickly, from one end to the other, without a pause. It is possible that fish might be protected in places in a pass where they are likely to rest, by covering them over with a roof. Also, it ought not to be beyond the powers of invention to devise a railing, fencing, or grating that would make the salmon immune at such a point from the attacks of poachers. We hardly know enough yet of the willingness of running fish to ascend tunnelled passages, but it is on their willingness to do so that one of the systems, that of Mr Cail, which will be noticed presently, must depend in some measure for its prospects of success. But, to be sure, such strong gratings or fencings and their upkeep all add to the already considerable expense.

There are large provisoes, however. You cannot always apply this scheme to a weir made for the purposes of a mill wheel, of navigation, or of manufacture, because it might take away too much water. You cannot always insure immunity from poachers. You cannot invariably command an indefinite amount of money. Apart from the question of the abstraction of water, the natural obstacles present little difference from the artificial, for the purposes of this chapter; and the line of division that we have to take consideration of is the distinction between upright and sloping faced weirs. The "apron" is the technical term for the slope of the weir in the direction in which the water runs over it. If the slope of the "apron" is moderate, by far the best and most economical plan, as proved by very many experiments, is to have a board run diagonally from the upper edge of the weir into the river below. A depth of about five or six inches is enough in the boards. The idea was first given by the behaviour of the fish at the Museum dam at Durham, who went up using the outside edge of the "ladder" as a support. But an improvement on the simple diagonal board was hit upon by the salmon fishery inspectors, and first tried on the Torrington Canal weir of the river Torridge, in Devonshire. It consists in having two boards running to meet each other in the form of two sides of a "V," but leaving a gap open for the passage of salmon at the foot of the letter. The advantage of this over the single board is that it collects a body of water, so forming a predominant current, and tempting the fish to run up. It may then be placed in the middle of the weir, whereas with the single board it is almost necessary that this should have its foot in the pool where the fish naturally congregate; and this may be a pool where they are liable to poaching. In any case, the stronger stream collected by the "V" with its bottom left out is an inducement to the fish to attempt the ascent. The boards, whether single or double, collect the water that otherwise would pass in a thin sheet over the whole surface of the "apron" to a sufficient depth along their upper side to permit the passage of the fish.

More formidable obstacles are presented by these falls and weirs that give a more or less vertical fall of water. For dealing with these there is a device that, where practicable, is cheaper, more simple, and better than any stairway made in the face of the fall or weir. It is obvious that the height which the fish have to jump in order to ascend the fall is lessened if, and by so much as, the level of the water at the foot of the fall is raised. This can be effectively done by making a second weir or dam below the first, or, if necessary, a third dam again below the second one, and so on, in order to give the fish a succession of small and easily negotiable falls to jump, instead of an impossible one. The objections to this idea are that it is not very feasible, except at immense cost, where the river is very wide, or where the current is so strong that the dams have to be very well made to resist it. It is very suitable, however, for enabling the fish to ascend falls in small rivers and streams, up which they wish to pass to the spawning grounds. In the case of a millstream coming back again into the river below the first obstruction it is obvious that this additional supply of water may be utilised if the second dam is made below the point at which it comes in again. It may be noted that advantage may sometimes be taken of a frozen over state of the river to slide out blocks of stone or concrete to a spot just above that in which they can stand with best advantage at the bottom of the river, and that trunks of trees, felled on the spot, and so on, may be utilised. But those are matters of detail which the circumstances and conveniences of each locality will readily suggest.

On a broad river, however, or where the stream is so impetuous that such a weir of any permanence would be too costly, it may seem necessary to resort to some mode or other of the stairway in the face of the fall. It is not a little singular, seeing how many and various have been the devices tried and found wanting since, that one of the most successful of those stairways ever seen was made as long ago as 1856 at Ballisodare, in Ireland. There was also a very successful one made on like principles on the Galway River. The magnificent pass at Deanstone belongs to a different category, because it was constructed at the same time as the dam itself. Subsequent legislation has provided that newly erected weirs shall have adequate fish passes left in them. The problem at the moment, therefore, is the construction of passes that shall give the fish fair opportunity of ascending falls of water that at present are insurmountable, and this was precisely the problem that was triumphantly solved by the stairway at Ballisodare, in Sligo county. An admirable account of this justly famous pass is given by the late Mr. Francis Francis in his pamphlet on "Salmon Ladders." "Previous to 1856," he writes, "the Ballisodare River, which is formed by the junction of two rivers—the Avonmore and the Arrow—held no salmon. Occasionally a few fish came into the bay, and made their way to the lower falls, which are at low water 19½ feet high, and at high water some 5 feet or 6 feet less. Once in a way, in extremely high tides, a fish or two would contrive to scramble up the broken water on the left hand side of the fall, where there are some broken ledges; but the fish never got past the Collooney, or highest fall. Mr. Cooper, having obtained an Act of Parliament for a 'several' fishery, and purchased up all the rights which could interfere with him, planned three ladders—one at the lowest, or Lower Ballisodare, fall; one (the upper Ballisodare ladder) at a place some distance above where there were a succession of rapids and small falls, which, though 2½ feet less than at Ballisodare, were so abrupt as to be quite impassable, being 16½ feet high. After some failures the ladders were completed. Spawning salmon were put up above the falls, and the place to a small extent was stocked with ova. Smolts appeared, and went down to sea. In due time grilse returned, and year by year increased, until now the river has become a regular salmon river, and one of a most productive character." "The cost of these two passes," says Sir Spencer Walpole, in his report on the Fisheries Exhibition, "with a third of less importance at the intervening falls, was about £1000, and their construction has practically created a salmon fishery worth £3000 a-year!" Some deduction, perhaps, must be made for the fact that this was written at a time when salmon seem to have been more numerous in our rivers generally than they are now, but, nevertheless, it stands good as it was made.

The ladder or stairway is made in two flights of stairs, so to say, the first flight, that is the flight nearer the foot, being far shorter than the other, and pointing nearly down stream from the foot of the fall; the stairway then bends sharply at an angle more acute than half a right angle, and runs straight up, beside the bank of the river to the top of the falls. "Its extreme length," says the writer previously quoted, "is 248 feet, so that, with a fall of 19½ feet to overcome, the 'ladder' shows an incline of 1 in nearly 13. The side walls of the 'ladder' are built of rough-hewn stone, two feet thick for the most part, for it is an exceedingly substantial erection." At the acute turn of the ladder a solid wall of masonry of like substance holds back the water. The ladder "is 10 feet wide in the clear; the chambers in the upper part are mostly about 11 feet long, while in the lower part they are about 12½ feet. Thus there is ample room for a salmon to rest, and in comparatively quiet water. The stops" (of strong vertical planks) "are 21 inches high on the lower side, and 16 inches on the upper. The breaks in these stops" (for a space is left between the end of the stop and the left or the right hand side of the ladder respectively in alternate stops) "are 13 inches wide; at about 14 inches or 15 inches in depth in parts of the compartments.

"The ladder over the Collooney fall is similar in design to that just described, though differing somewhat in detail. Its entire length is 200 feet, which gives an incline of 1 in 12, the rise from water to water being about 16½ feet. The width is 8 feet 9 inches, and the chambers average 8 feet 6 inches in length. The stops are 19 inches, with breaks 11 inches wide.

"The three upper stops, however, are different from all the rest. They were originally 20 inches high, with 9-inch breaks, but the rush of water was found to be too great, and a plank 13 inches high was placed on the top of each of these stops, extending right across the ladder, but leaving the openings we originally made. With one or two minor alterations suggested by experience, the ladder acts admirably, and the fish, which used to jump, and jump in vain, at the hopeless obstruction, swim up it with the greatest ease."

I rather understand that they go up it by swimming round, through the breaks in the stops, or by jumping from stop to stop, indifferently. Evidently the jumping would be the way of getting over these upper stops that are without a break. There is one point that it is well to draw attention to. This ladder, the floor of it, the stone surface, is at an incline. The effect of this is that just under the fall of each stop the water is shallower than it is at any other part of the compartment. This, where the salmon have to jump, is just as it should not be; for a salmon requires deep water as its "take off" for a leap of any height, and a big fish requires more depth than a small one. Where the leaps are so small as in the case of the stairway under discussion, this is of little consequence, but where the leap is at all considerable attention should be devoted to giving the fish adequate depth at the "take off," and the stop should be levelled out to something like the horizontal.

It seems curious that, having before them, so far back as 1856, a model pass that was such a success, the Government should have committed itself to a series of subsequent failures with these "ladders." It was not that the lessons of Deanstone and of Ballisodare were neglected, but that they were misunderstood. The size and gradients of the Ballisodare stair have just been mentioned. The magnificent Deanstone varied from 9 feet to 40 feet in its width, and its gentle incline was something like 1 in 27. The Government, seeing these things, said "salmon can go up stairs"; and seeing that men can go up stairs at steep gradients it did not occur to them that it was otherwise with salmon, so they made passes as steep as 1 in 3, of which the steps were 4 feet wide. The fish then declined the ascent, or rather they made gallant efforts, but inevitably failed.

It is the generally received opinion that it is no use attempting to make a fish-pass of this kind unless you are going to give the fish a width of 8 feet, and an incline of not more than 1 in 10 or 12. If you cannot undertake as big a job as this, let it alone, for it is but waste of money to make a stairway either steeper or narrower than this.

And for the height that you may ask your fish to jump, let us put it at 3 feet, for a sheer perpendicular leap. That fish have jumped far higher is nothing to the purpose. We have to think of the condition of fish about to spawn, not of fish in hard high-jumping training. Three feet is enough to ask of them, and you can only ask them to do this provided you give them a depth of some four or five feet to rise up through perpendicularly. A good rule to make is that if you ask fish to jump, you should give them half as much again in depth of water for the "take-off" as the height of the fall.

Summarising, therefore, the results thus far arrived at, we find them to be much as follows:—

If you have a weir with sloping apron to get your fish over, and it is not too steep or too large, adopt the diagonal boards on face of the apron in an open-footed "V" shape.

If you have a nearly perpendicular fall you may do one of several things: you may make a pass round, as at Dupplin, on the Earn; but this is expensive, you have to give your fish protection from poachers, and it takes water away from the main stream.

Or, if the river be not too wide and the stream too strong, you may build a dam or dams below the first, to cut up the big leap into two or more small leaps. But this cannot be done in a very broad or strong river, except at great cost; and must be done in accordance with the provisions named above as to the depth of water just below each fall.

In case of a weir you may (*a*) cut a gap, or pass, at such an incline that fish can run up it, to concentrate the stream in the centre of the weir's face, unless this takes too much water from the channel, for raising which the weir was made. If that is the case it is possible to (*b*) raise the crest of the weir everywhere except in the middle, thus producing practically the same effect as (*a*) without taking water in anything like the same extent from the channel artificially raised. It may be noted, by the bye, that the amount of water diverted by the making of fish-passes, and the resultant lowering of the artificially raised channels, has been vastly exaggerated in the common outcry on the subject.

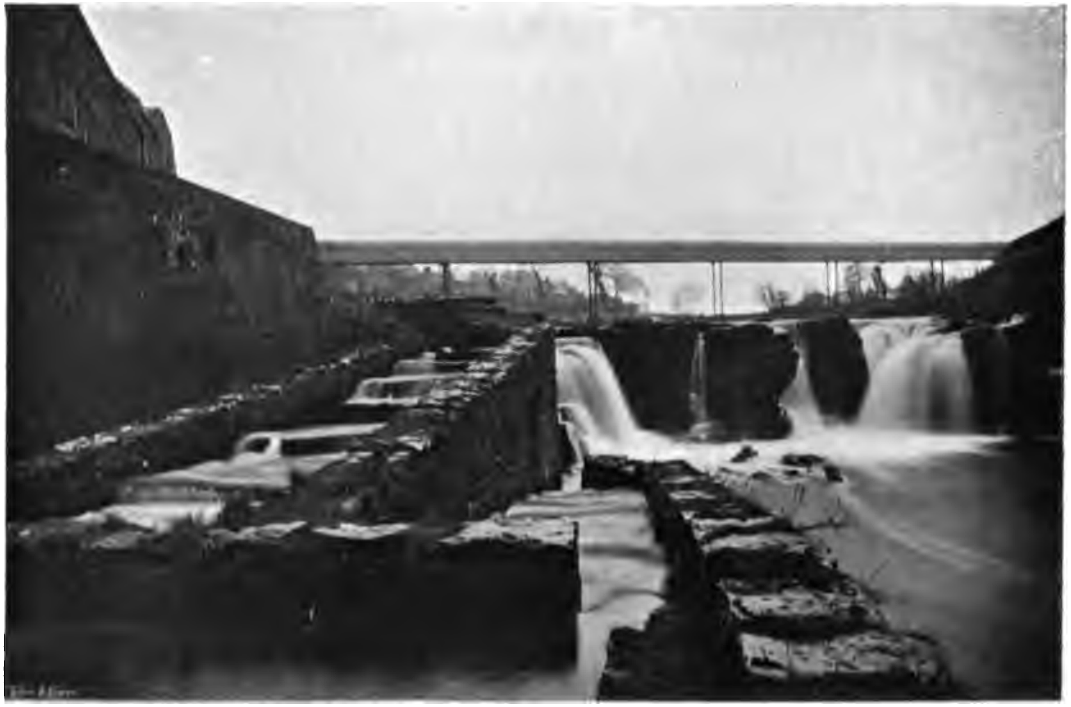
Or, you may make a stairway as at Ballisodare, or on the Galway, only in this case the incline must not be sharper than 1 in 10, and the way must have a width of 8 feet.

As to the expense of the last—the stairways at Ballisodare and Collooney cost about a thousand pounds. It is estimated that a perfectly practical and good ladder over a fall of eight feet high can be made for from four hundred to five hundred; but, of course, the cost must vary with the situation, the accessibility to material, and the bed on which the ladder would be laid.

The ingenious idea associated with the name of Mr. Cail is to stop back the water by ledges, as in the usual mode of "ladder," but instead of leaving a space between the stops and the sides of the "ladder" at alternate ends of the stops, he bores a hole through the ledges sufficient to permit fish to pass—say eighteen inches wide. It is claimed that it has been very successful in one case at least, and it has the merit of diverting very little water from the artificially raised channel. There is also the device of a Mr. Macdonald, an American, that appears to be virtually an extension of the idea of the "ladder" steps, the difference being that he lays his steps slanting so as to meet the current, instead of making them horizontal. The effect is to make a spurt of water over each step. But they are said to get clogged up badly with the flotsam during a spate, and not to be as satisfactory as the upright steps.

Salmon, it is to be observed, do not like spurting, splashing, broken water. If possible, it is far better to give them a solid down-flowing mass for them to work up through. The general need of the day is rather for the making navigable by the fish of the small falls in the small streams that they wish to go up for spawning than for the magnificent style of work. This is being done at places, notably on the Moriston River, by Mr. Malloch, of Perth, at the present moment; but these are isolated cases. In very many streamlets there are obstacles to the ascent of salmon to beautiful nursery ground that could very easily be removed by damming the stream, and so heightening the "take-off" below the obstruction, in one or more places, as required. It is a plan so easy on a small stream, and so inexpensive, that it should be adopted far more often.

52 —RUKANFOS FALLS

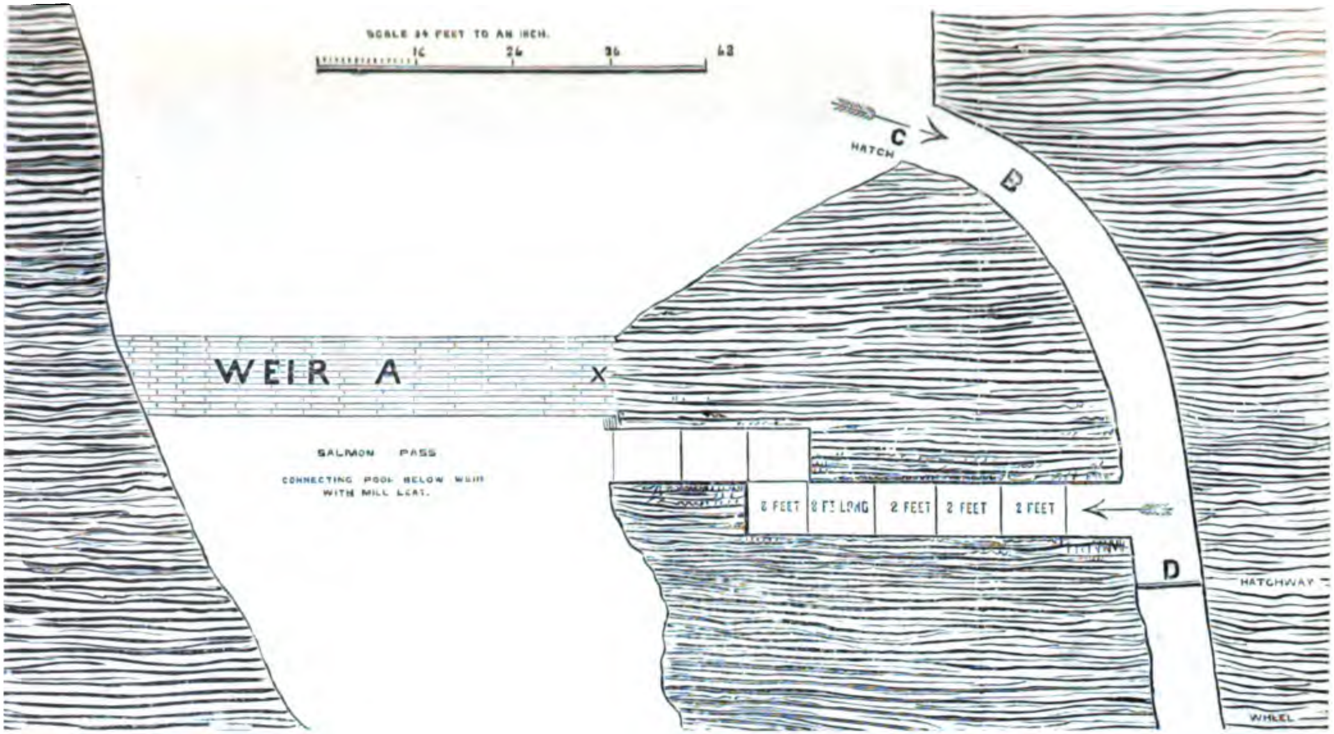


53 COLLOONEY PASS.

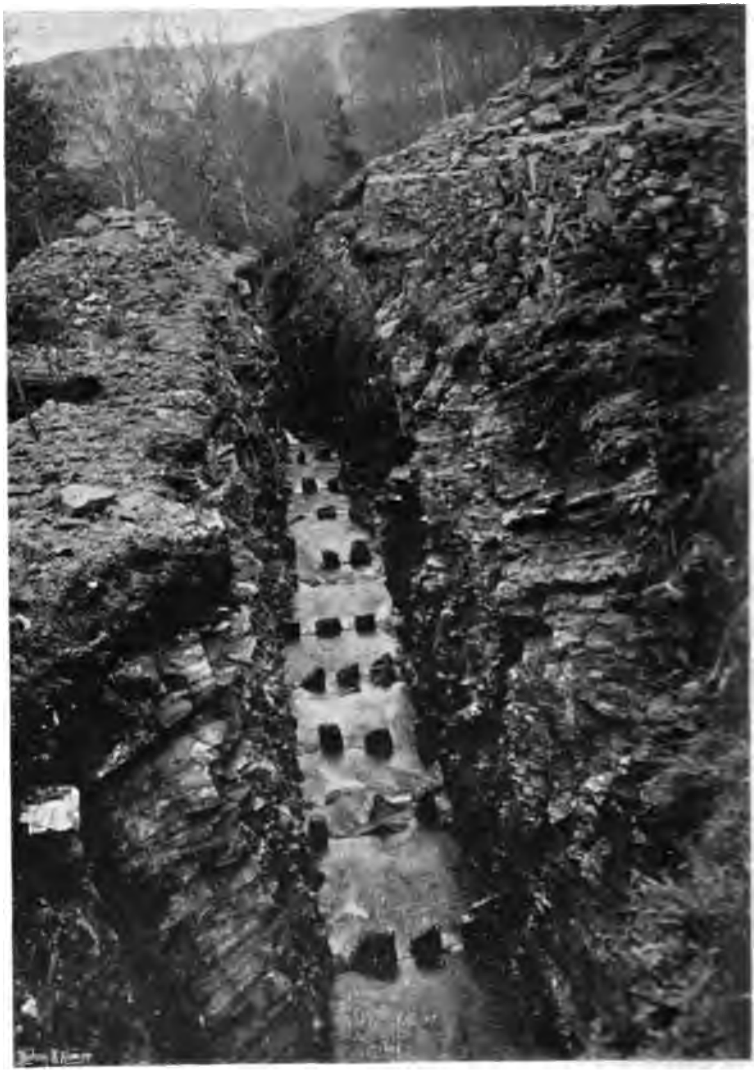
By way of illustration of the magnificent in salmon-passes, we append an illustration of one over the Rukanfos Falls of the Sire River in Norway. It is one-fifth of a mile in total length, and gives the go-by to a fall of 72 feet high. The mathematician may work out the gradient of this for himself. It will be seen that it is not at all considerable; but the length of the pass is portentous. I have seen the figures given as "nearly half a mile," for the length of the pass, and 89 feet for the height, but I believe the former to be correct. It is said that fish do ascend this pass comfortably. In any case, it is a notable work.

The names of people who have invented different varieties of fish-passes are legion; but all are more or less modifications of a few ideas. The great point is to find out what modification, or series of modifications, is best suited to the conditions of each case. It may quite well be that the circumstances (some weirs are in part natural, part artificial, advantage being taken, in making the artificial, of the natural rocks, &c., already there to serve as helps) admit the employment of two or more of the above suggested methods in combination—*e.g.*, a sloping diagonal ascent into a chamber (which must then be a capacious one), whence a leap may take the fish over the fall, or the case may be reversed, the leap preceding the rush; or a combination of raising the "take off" with the other aids to the ascent may be adopted. Ingenuity, and not a fixed type of engine or device, must meet the various difficulties. Especial study, too, should be given to the circumstances of the obstacle, the depth of water running over it, &c., just at the times when fish will be induced by the general conditions of the river to come on the run. All these are the suggestions of common-sense, but a lack of that homely quality has been apparent more than once in the fashioning of salmon-passes. To give some idea of the numbers of those who have given attention to the work and brought out models of their own, or made what they at least believed to be important improvements on the models of others, we may just mention as they come to one's mind at haphazard—Forsyth, Smith, Smith-Roberts, Brackett, Cail, Macdonald, Brewer, Foster, Landmarck (in Norway), Pike, Atkins; all these, and many others, have had some ingenious and unfailing device, different (perhaps in some slight degree, but the inventors would not admit its slight importance) from that of all others. But still the fact remains that no universally best type of pass has been invented to suit all contingencies. There is still room for the exercise of common-sense and a wise combination of plans.

One point that may be worth mention, obvious though it should be, is that in considering the position and kind of a projected pass, special attention should be paid that the right amount of water, not too much nor too little, shall flow through the pass at the time when the river generally is in the right condition for the running of



54.—*WARDEN DAM (from 1875 Report).*
By permission of the Comptroller of H.M. Stationery Office



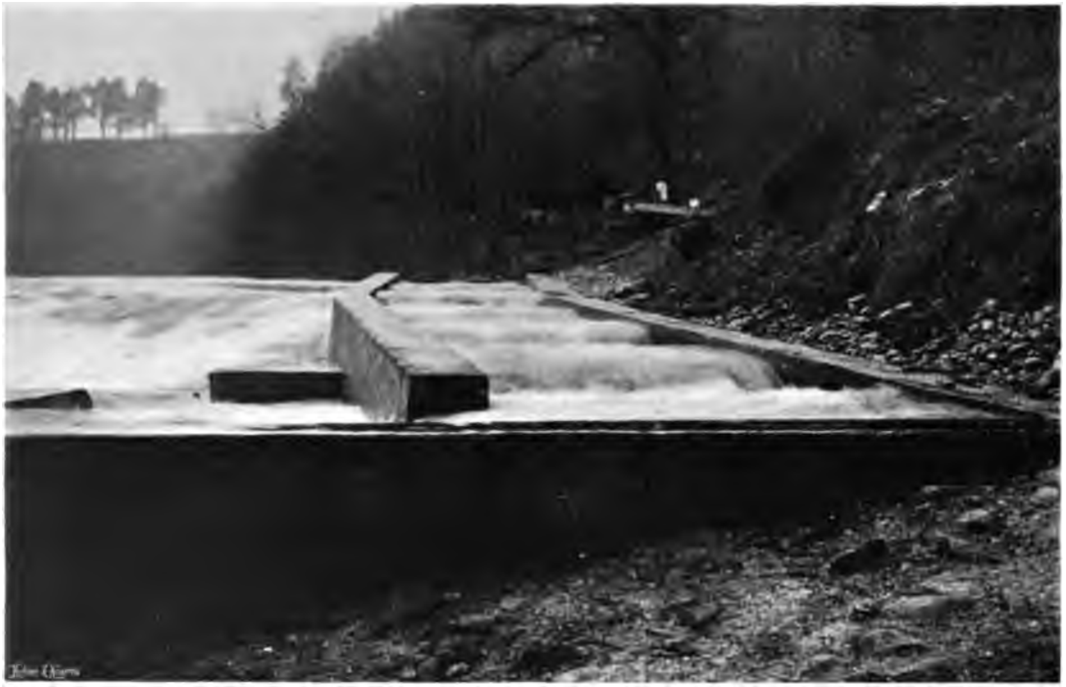
55.—MORISTON PASS.

fish. Your pass, even with the most ingenious contrivance of flood-gates and so on (and there is room for much ingenuity in this regard) can hardly serve you well if its natural tendency is to carry the right amount of water to let fish up either when the rest of the river is in such heavy spate that the fish will not face it, or so low that they are not encouraged to run at all. You want your pass to be at its best just when the river generally is at its best.

How much can be done by a little well-directed ingenuity is shown by the old pass at the Wärden Dam on the Tyne. Here is a weir that for a long time impeded the ascent of fish. A passage which fish can easily ascend was made between the pool at the foot of the weir and the millstream. It is impracticable for fish while the mill is working, but when the mill ceases work the miller shuts down a hatchway above stream from his wheel, just below where the passage from the weir pool goes into the mill leat. The effect of this is to block back the water, which then runs through the passage into the weir pool, tempting the fish gathered there to ascend and so pass into the millstream, and thence into the main river again above the weir.

One of the very latest essays in the making of fish passes is shown in the accompanying picture of the new pass on the Moriston river. The fall is steep, and the old attempts at a pass were often washed away and gave no results. The photograph from which the picture is given was taken when the water was only about half turned on (there is a means of controlling the water above the fall so completely that in summer the whole stream can be turned into the pass), and the photograph is taken from a height of about 43 feet. The fall from the surface of the water above to the surface below is 27 feet. The pass is 168 yards long, with an incline of 1 in 21, and the stones to break the force of the water and to afford lodgment for the fish are placed at intervals of 16 feet. The stones stand up to a height of 2 feet 6 inches from the floor of the pass. At the intake there are three sluices of different heights, each of 4 feet in width. The pass itself is 10 feet wide, and the cill of the intake is several feet below the top of the fall. Immediately below the intake is a tunnel of about 20 feet long, to keep out the river in cases of heavy floods, which in this river are very severe, sometimes rising over 20 feet. The outlet of the pass goes into the pool at the foot of the fall.

This pass has been a very great business. To give some idea of its magnitude, it may be said that the rocks on both sides were so high that it was necessary to cut down 33 feet from the top to the floor of the pass. The rock was of hard substance that had to be blasted out and the fragments lifted away with cranes. Many former attempts have been made to get a satisfactory pass over these falls at the side of the river, nearly £500 having been spent in vain, for the passes always got knocked to pieces and washed away by the heavy floods. Now, however, that the pass is



56 -PASS ON THE ALMOND.

protected from the floods by the means indicated above, its constructor, Mr. Malloch, has every confidence that it will last for ever and a day.

A very satisfactory, but less striking, kind of pass has lately been put up by the same hand on the Almond River. It was concluded in the beginning of November last, since which time fish ran up freely over the weir and were killed in numbers above it, although two months previously it was impossible for them to pass the weir. The effect is that all the fish in the river now run up, and must reach spawning beds, from which they were practically excluded before the making of the pass.

Libellus varia
GENERA PISCIUM
COMPLECTENS.
Pictoribus, sculptoribus,
caelatoribus, aurifabris et
mire utilis et necessarius.
Nicolaus de Bruyn inventor

CHAPTER XII

NORWEGIAN ANGLING

By Captain C. E. Radclyffe

Introductory Remarks.—Norway, with its host of fjords, into many of which flow magnificent rivers, rushing down from the snow-clad heights of the interior, and free from all pollution in a country where drains, &c., are unknown, has consequently long been the paradise of many English sportsmen in quest of good salmon fishing. Alas! the days are no more when, as in the case of the old pioneers on many of the best rivers, a few kroners paid to some hospitable Norse farmer, would give one the free right of fishing many miles of a good river, and board and lodging at the farm, in return for the fish caught.

Long since have these simple-minded and contented farmers realised that the rivers, which for generations served them and their ancestors as a means of providing food, are daily becoming more valuable, and their demands and expectations increase accordingly. Happily the characteristic honesty of the Norse farmers still remains unimpaired; except in certain districts, where, owing to former dealings with certain classes of tourists, they have begun to regard persons of this stamp with distrust, and, accordingly, as their lawful prey. Taken as a whole, however, they are not slow at discovering the genuine sportsmen, and treat them as such.

It should be understood that as Norway is practically a country without large landed proprietors, each farmer owns the land, and part of any river on which he lives. Formerly it was the custom to rent direct from these farmers, if any one desired to take any part of a river which was unlet. A few instances are still existing where some English sportsman has been fortunate enough to become the proprietor of certain parts of Norwegian rivers. But there is now a law in force which renders it difficult for foreigners to purchase estates in Norway. It therefore only remains for those desirous of keeping certain fishing rights, that they should rent them on long leases from the proprietory farmers. This has been done by many of the old hands who annually visit Norway, but it has not prevented them from losing many of their old haunts, owing to higher bids from others at the expiration of their leases, and before they had renewed them. Such being the case then, at the present moment all the principal Norwegian anglings are in the hands of two sets of people. One being the old pioneers, who still hold rivers on long leases; and the other, people who have acquired leases of fishings with the object of reletting them again at a profit. At the time of writing the two principal agencies which control the best rivers are the Anglo-Norwegian Fishermen's Association, and secondly, Mr. Johan Gran and Mr. Beyer of Bergen, who are represented in London by Messrs. Lumley, Newton & Dowell, of Lumley House, St. James's Street.

The first-named association, according to its advertised prospectus, lays claim to the following advantages:—

"It will act when required as a private agency for letting the fishings or sporting rights of its members. As the members hold fishing rights upon most of the principal Norwegian rivers, the association will be in a position to refer persons desirous of taking fishings in Norway to reliable sources of information." Further details can be obtained from the Hon. Secretary, Mr. A. Venables Kyrke, Chard, Somerset.

Full details of the rivers and beats of which the Bergen river-agents hold the leases, will be found in Messrs. Lumley, Newton & Dowell's book on Norwegian Angling, which is published annually by them. Naturally there are numerous anglings which are not controlled by either of the parties named, but space will not allow a larger list than the two sources mentioned, through which one can practically obtain the pick of Norwegian fishings at present on the market. No scale can be laid down definitely for the actual rent of beats on good rivers for a season, nor can we advise a better plan than to obtain a correct estimate of previous catches made on any beat for the corresponding period which it is intended to rent, together with the actual rent paid by a former tenant, provided that he is a man who is likely to know the real and not the fancy value of such fishing; and if so, then it is not running too great a risk if the new tenant takes his chance on a river at the same rent as his predecessor.

Like all other rivers in the world, the Norwegian ones are subject to lack of water or floods, either of which are extremely detrimental to good sport; but it is well to bear a few points in mind when making a selection of rivers for the coming season. Firstly, then, it should be clearly understood, that the chief rivers of the country are all snow-fed streams. Therefore, if there has been a heavy fall of snow in certain parts of the country during the past winter, before Christmas, there will be a correspondingly plentiful supply of water in the rivers of this district throughout the fishing season, and *vice versâ*. But no one can foretell the result of a heavy rainfall, or very hot weather, during the summer months, as both these things tend to melt the snow and flood the rivers. One thing is fairly certain, and that is, that a winter of little fall, and the early disappearance of the snow in any district, will result in a low water season on the rivers there; and consequently these rivers should be avoided if beats on them have not been previously taken. Seasons in Norway, like those of all other countries, differ vastly as regards climatic conditions, and the consequent good or bad years' fishing as a result. A glance at the notes which follow on the Orkla River will give an idea of how a lack of snow can affect a river as it did this one in 1901; and how contrary may be the case in a big water year, such as that of 1902.

Volumes could be written on the variety of sport, and the various methods of fishing which the numerous Norwegian rivers offer. For here we find the finest of casting rivers, either from the banks, from boats, or by wading; also the easier forms of harling or of using a prawn; all of which are adopted on different rivers according to their character.

One lamentable fact cannot be overlooked, and that is the ever-increasing amount of netting along the shores of every fjord, and at the mouths of the rivers, and the consequent decrease in the size and number of fish killed by rods. Rivers in the South of Norway, from Tondre Bergenhunse to the Swedish frontier, with the exception of one small district, have suffered greatly of late owing to the weekly close time for netting having been there reduced from three days to only two days. In spite of all the endeavours of such men as Herr Landmarck, the energetic Inspector of Fisheries, the Norwegian authorities appear blind to the evils of so much netting, and the inevitable crisis which must come, when the Norwegian salmon fishing ceases to produce anything like it does even in these days, with the great falling-off that there has been in the last quarter of a century.

Little more remains to be said as regards a general outline of Norwegian fishing; but for the benefit of the uninitiated anglers, contemplating a visit to that country, a few details of the routes to be traversed, and the expenses of getting to and from the various rivers, may not be amiss, before dealing briefly with particulars of some of the principal rivers themselves. The object of the writer in the following article has been to describe as fully as possible the largest rivers, which may be described as ranking in the first class; touching briefly on most of the smaller rivers; and omitting a few of those of which he has not a personal knowledge or accurate information. The task of collecting all the details therein contained is by no means a light one. If, perchance, any statements appear in the article which are inaccurate, or give offence to any owners now holding leases on some of the rivers described, then I can only tender my sincere regrets that they should have been made. But the greatest care has been taken to state only what the writer has seen himself, and also information supplied to him by many of the best anglers in Norway. Trouble there will be to the end of the chapter in certain cases; since it is only natural in these days, when so many people are seeking to obtain leases of certain Norwegian anglings, that many of the old pioneers who have safely held such rights for years, see the chance arising of losing their rivers when opposed by some wealthy bidder. It is not, therefore, to be wondered at if certain of them are very reticent about making public the merits of their respective rivers. But, taken as a whole, the writer has met with the greatest courtesy from all those to whom he has applied for information, when he lacked personal knowledge of certain rivers. Here, then, he begs to tender his best thanks to all those who have assisted him to compile the following pages.

For the purpose of seeing at a glance the positions of the various salmon rivers in Norway, I have added a list of the rivers which lie between the different ports of stopping, where the Wilson line from Hull and the Norwegian line from Newcastle call each week. The rivers are thus divided into sections, which lie between two neighbouring ports.

LIST OF RIVERS.

Christiania to Christiansand.

1. The Drammen.
2. „ Skien.
3. The Nisser.

Christiansand to Stavanger.

4. The Torrisdal.
5. „ Mandal.
6. „ Lyngdal.
7. „ Qvina.
8. The Sire.
9. „ Birkreim.
10. „ Trafjord.

Stavanger to Bergen.

11. The Aardal.
12. „ Sand.
13. „ Etne.
14. The Odda.
15. „ Eidfjord.

Bergen to Aalesund.

16. The Dale.
17. „ Vos (or Evanger and Bolstad).
18. „ Flam.
19. „ Aurland.
20. „ Lærdal.
21. „ Aardal.
22. „ Aaro.
23. The Osen.
24. „ Förde.
25. „ Nausdal.
26. „ Gloppen.
27. „ Olden.
28. „ Stryn.
29. „ Nordfordeid.
30. „ Valdal.

Aalesund to Christiansund.

31. The Rauma.
32. The Sundal.

Christiansund to Trondhjem.

33. The Surendal.
34. „ Orkla.
35. The Gula.

Trondhjem to Namsos.

36. The Stjordal.
37. „ Aargard.
38. The Namsen,

Namsos to Tromso.

39. The Bindalen.
40. „ Vefsen.
41. „ Fusten.
42. The Rydsaaen.
43. „ Saltdal.
44. „ Maaselv.

N. of Tromso.

45. The Reisen.
46. The Alten.

ROUTES TO NORWAY—*Wilson Line.*—A steamer leaves Hull for Christiania every Friday. Average passage, Hull to Christiansand, 32 hours; and from Christiansand to Christiania 12 hours. Actual open sea passage about 30 hours.

Rates of Passage.—Hull to Stavanger or Bergen, first class return, £7; Hull to Trondhjem, first class return, £9, 15s.; Hull to Christiania, first class return, £7, 10s.

The Norwegian Line.—This Line runs fast boats from Newcastle thrice weekly in the summer to Stavanger, Bergen, Trondhjem, and the intermediate ports. Their rates of passage are: To Bergen or Stavanger, first class return, £6; and to Trondhjem, first class return, £9, 15s.

MAIL ROUTES TO NORWAY.

The two principal lines which run from England to Norway are the Wilson Line from Hull, and the Norwegian Royal Mail Line from Newcastle.

The Wilson Line.—A steamer leaves Hull every Thursday during the summer months for Trondhjem. By calling at Stavanger, and proceeding

57.—ON A NORWEGIAN RIVER.

58. THE BEST BEAT.

thence within shelter of the islands along the Norwegian coast, the open sea passage to Trondhjem is reduced to about 25 hours; as these steamers, under ordinary circumstances, perform the passage from Hull to Stavanger in a little over 30 hours, Stavanger to Bergen 8 hours, Bergen to Aalesund 14 hours, Aalesund to Christiansund 5 hours, thence to Trondhjem 7 hours.

THE VOS ELV OR EVANGER RIVER.

Situation.—Flows into the Sör Fjord N.E. of Bergen.

Route.—From Bergen by rail to the different stations on the river. The railway from Bergen to Vossevangen runs up the valley of this river.

General Description.—With a catchment basin of over 1400 square kilometres, and its chief source in mountains some 6000 feet high, it keeps most years, even with little rain, in fishable trim till mid-July. The run of fish is early, usually from 1st June, and consists almost entirely of big fish. The ever-increasing number of nets, fishing five days per week on the coast, and on the long narrow fjords, has seriously affected the river; but, as might have been expected, very much less in its early than in its autumn fishing.

The upper section, issuing from Vangs Vand, and including a small lake, ends after a run of some 5 kilometres at a gigantic stone; which, damming the channel, causes a five-foot fall. This stretch of the river holds big fish, and fishes best late in the season; the fall and rapids below it keeping back the fish till the water lowers. It is now unlet, and is netted, but leave to angle can generally be obtained. The middle section, termed the Evanger, runs from the "Stor Sten" above-mentioned to the Evanger Lake, a distance of some 8 kilometres. The most productive pools are owned or held on long leases by Mr. E. Sturdy, who generally lets it for June and July, and gives the very uncertain later fishing to the landlord for his visitors. A short section of the river, and a short stretch of the north bank, together with some jointly-owned water, is leased to the Bergen river dealers, who let it.

The third section, Bolstad, 4 kilometres long from Evanger Lake to the Fjord, is held also on short lease by Mr. Sturdy, who fishes it in June and July, and in August and September lets it occasionally for a nominal rent. Of the autumn fishing on the last two sections, and that on the joint water generally, an angler once said: "They are worth fishing, but not worth paying for."

Though Vos elv is in size only in the second class, it is equal to the largest in the weight of fish. In 1901 the first 28 fish taken in the Bolstadt averaged 29 lbs., and both numbers would have risen to 30 had a grilse or two not been caught before two fish weighing together 84 lbs. were landed in one day, a trifle later. In the Evanger section two fish, weighing together 99

59 —*EXPECTATION.*

60.—THE STRIKE.

lbs., were caught in one season. It was there also that the 58½ lb. salmon, now on view in London, was taken in 1902. It was of this fish that Mr. Sturdy wrote, saying that it was the heaviest caught by rod and line he had ever seen in its own skin; and he has told the author that no one has written or told him where a salmon of equal or greater weight could be seen. It is possible that this Evanger section may be in the hands of the Anglo-Norwegian Fishermen's Association for letting during 1903, and it may interest some present and future readers to know that the rent is about £200 for the whole season. The Bolstad section will be let for August and to 14th September, probably for £20.

THE OLDEN RIVER.

Situation.—Flows into the S.E. corner of the Nord Fjord.

Route.—From Bergen by local steamer.

Description.—This river, which has its source on the Justedal Glacier, flows through a considerable lake, whence it issues and falls over a foss, up which salmon cannot ascend. The total length of fishing water from the foss to the fjord is rather less than two miles. The river rises and falls very rapidly according to the warmth or coldness of the wind, but it is seldom affected by rain floods. Glacier water generally begins to come into the river about the first week in July, after which time the river gets often thick and milky. The fishing is all casting, and, with the exception of one pool, this is all done from the bank. It is a very sporting little river, as the stream is rapid, and if a fish goes down stream there is often trouble, since it is by no means easy to follow it. In quoting the list of flies, Mr. Byron says, "I should say that the Jock Scott is the best all-round fly, but I also like silver bodies, such as the Dusty Miller and Lady Grey, for the early part of season. The Poynder, Durham, Ranger, and Butcher are also good, especially later on." Fish average about 18 lbs., and most seasons one or two fish of 30 lbs. are killed; on rare occasions they have been killed up to 40 lbs. Mr. Edmund Byron, late Master of the Old Surrey Hunt, has owned this river since 1871, and the author is indebted to him for particulars of his river. Speaking of the run of grilse on the Olden, he says, "I do not know why, but we do not get many grilse. Later on in August there are a good many small sea trout caught in the lower water. In olden days it used to be a very good sea trout river, but the larger fish, which ran up to as much as 20 lbs., are seldom if ever caught now."

THE FÖRDE RIVER.

Situation.—Flows into the Förde Fjord.

Route.—From Bergen by local steamer.

Description.—The extent of angling water on this river extends to a distance of about four miles up as far as a foss, beyond which the salmon cannot pass. This river depends very much on a good snow year, or rain, as although there is nearly always plenty of water to fish in, it has a great tendency to run very clear, and in consequence the fish get sulky and cannot be induced to take. The river can be divided, for the purpose of description, into two parts. The top beat, from Foss Pool to Brulandsberg, is about 2¼ miles in length, and contains eight or nine pools. Of these some are fished from the banks and stages, and others by wading. Brulandsberg Pool is fished from a boat. These are all good sporting pools. The lower part is from Brulandsberg to the pool at the bridge at Fōrde. The pool is affected by the tide. This part of the river contains long, broad, and swift running pools, which are rather bare of stones, and are better for sea trout than for salmon, with the exception of the bridge pool, which gives good sport if fished at the proper time of the tide. Most of the fishing is done from a boat on this part of the river. The Fōrde is best fished during the evening and night, and is generally very little used by day. Any of the usual lures will kill; but early in the season very large-sized flies are used. Fish vary very much in size, and often run up to big weights. The run of fish begins early in June, and the river is at its best from about 15th June to the end of July. The water affords ample fishing for two rods. As an example of what sport the

Förde can yield, the two following catches may be quoted. In 1899 the season's bag was over 2500 lbs., and in 1902 the bag was 100 salmon, 74 grilse, and 113 sea trout, with a total of 1962 lbs. The leases of the Förde are held by Mr. Beyer.

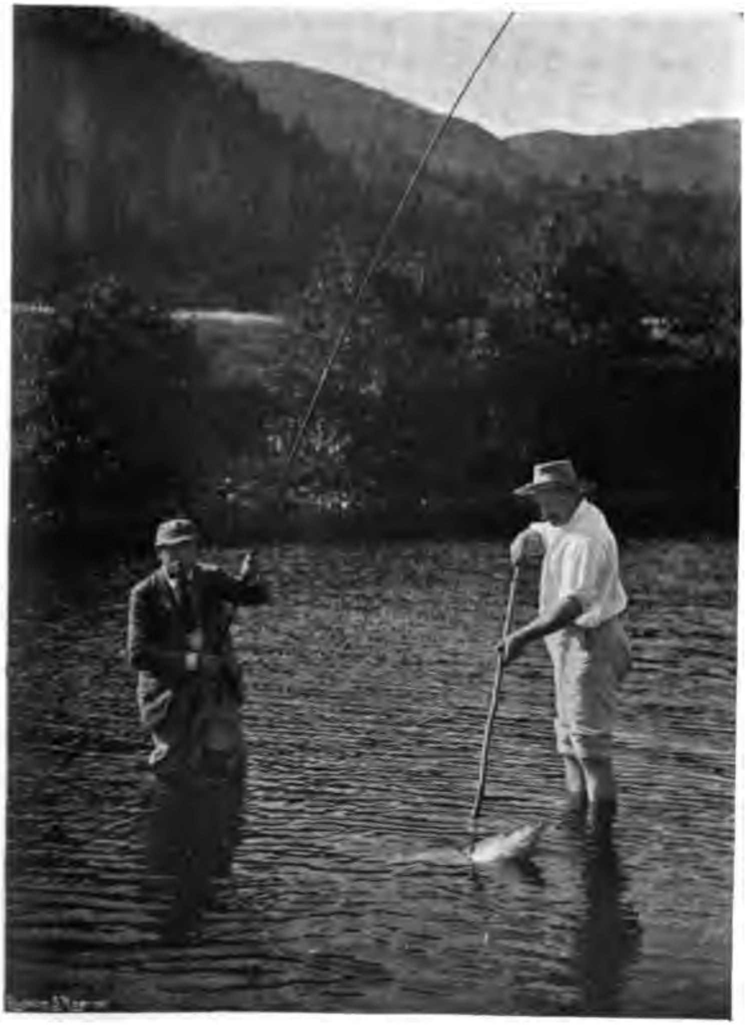
STJORDAL RIVER.

Situation.—Flows into the Trondhjem Fjord north-east of Trondhjem.

Route.—From Hull or Newcastle to Trondhjem, thence by rail to Hegre, Floren, or Gudaaen stations.

General Description of River.—The best fishing water on the Stjordal extends from about three or four miles above the river mouth, up to Meraker Foss, a distance of about thirty English miles. The leases of the fishings from the boundary of the Meraker district to a point below Hegre, have been held for many years by her Grace Lily, Duchess of Marlborough, in whose hands they still remain. All the beats on this water are at present let during June and July, but arrangements have been made whereby Mr. Beyer has the right of sub-letting them after the first week in August each year. Roughly speaking the river may be divided into three sections.

The Lower Section, extending from below Hegre up to the mouth of the Fora River, which is a small tributary. Here the pools are long, and the river winds, forming many curves. The banks are composed of gravel and clay, and are subject to land-



61.—REALIZATION.

62. TYPICAL VIEW OF A NORWEGIAN RIVER.

slips, with consequent discolouration of the water. The stream runs fairly rapid, the pools in places being very deep.

The Middle Section extends a distance of about nine miles up to the Black Pool. Its character is similar to that of the lower section, but the stream is swifter, with heavy rapids at the top.

The Upper Section extends to Meraker Foss, and the lower part of this is very rocky, and has heavy water. A portion of the middle section at Sœrkill is owned by Captain Hamilton, and the upper water above Kringen belongs to Major Cotes and Captain Townshend.

The fishing is casting, or harling, and is practically all done from a boat, although certain pools can be cast from the rocks, and from the railway embankment.

For casting, the best list of flies is quoted by Mr. E. J. Brook (who has fished the river for many seasons) as follows:—1 Wilkinson, 2 Jock Scott, 3 Thorndyke, 4 Bell Irving (Turnbull's dressing), 5 Dusty Miller, 6, in small water, the Ackroyd with drake wing. Sizes from 7/0 to 5. A 17-ft. rod will be found sufficient, and treble twist casts are used as long as the water is not very clear. For harling, small silver and copper spoons, and early in the season sprats are effective.

Salmon usually begin to run from the first week in June, and the run is practically over by 15th July. The August fishing is, therefore, chiefly for sea trout, which are very numerous, and also grilse, with a certain number of red fish which have been some time up the river.

The average weight of salmon on any river is hard to work out, unless very exhaustive records are collected from every beat on the river, but a 30-lb. fish is not a common occurrence on the Stjordal, although I have heard of a 45-pounder taken there some time ago.

The season of 1902 was a very good one, as was the case on most other rivers owing to the big water, and consequently sport was good right up to the last.

A FEW REMARKS AND NOTES REGARDING THE RIVERS ON THE SECTION CHRISTIANIA TO CHRISTIANSAND.

(1) *Drammen River.*—Salmon only ascend some 7 kilomètres up to the Hellifos Falls, beyond which very few fish pass. The fishing is almost exclusively commercial, *i.e.* done by netting, and no part of the river is suitable for letting for sporting purposes, although the natives do some little rod fishing, principally trolling with spoon. The quantity of timber floated down the river, and the pollution by acids and leakages from the great pulp manufactories, especially on the spawning beds, combine to spoil the available water as a salmon river, the pollution and sawdust proving great deterrents to the ascent of salmon. This and the fact that the netting has of late years been much extended down

the brackish water in the estuaries and as far down as Svelvik has greatly decreased the stock of salmon in the river for some years past. Fish ascend middle of June.

(2) *The Skien River* is hardly adapted for salmon; it has very few spawning grounds, and is so deep and slow that even the largest ships sail all the way up to the town of Skien. Salmon run up about 10 kilomètres, and a little above the town of Skien are the sluices through which the local ships are lifted up into the Telemarke Lakes. That very few fish pass these sluices is a matter of course; there are still a few salmon in this river, although there are hardly any spawning grounds for fish, and the pulp manufactories do a lot of pollution, yet the few fish that pass the sluices the fishery inspector thinks spawn in the Hjelle Lakes, whence a tributary runs into the Skien River. The town of Skien owns part of the river, and riparians other part. Fish begin to ascend end of June.

(3) *Nisser River by Arendal.*—Fish ascend some 17 kilomètres up to Rygene Fos, beginning to run about 20th June. At the Rygene Fos a ladder is made to facilitate the ascent of fish to the waters above, but very few fish pass, as the trap is locked up by the great pulp factory there as soon as the water gets low, which is the time when the fish would and could ascend. From the Rygene Fos downwards for a length of a few kilomètres only can sport be had, and this beat has been let mostly to British sportsmen. Below this beat great commercial fish-

ing with all sorts of nets was done, yet in some seasons really good sport on this beat has been had. A large section of nets has recently been bought off below the rod angling water, and the fishing rights have been bought up by some English owners.

(4) *The Torrisdal River.*—Salmon ascend some 15 kilomètres to Vigeland Fos, and begin to run first week in June. An Englishman, Mr. Hawkshaw, owns the Vigeland Fos Timber Sawing Company and large properties to which belong fishing rights over a beat some 3 or 4 kilomètres long from the fos downwards, which is fairly good fishing. Below this the farmers do their own fishing by netting for a length of 6 or 7 kilomètres. Then comes other netting water, on which a private club in Christiansand has acquired the right to fish, but no exclusive right, as the farmers are doing their netting as well. Altogether the Torrisdal River is more a commercial than a sporting one, owing to the fact that the salmon are stopped too soon, viz., at the Vigeland Fos, only 15 kilomètres above the sea.

(5) *Topdal River.*—Salmon ascend only to Boens Fos, some 10 kilomètres, and only a few fish go beyond this to the Teine Fos. Below the Boens Fos there is some very good rod fishing on a beat which is hardly a kilomètre long, and belongs to a private owner. Fish run very small, and begin to ascend first week in June. Below this beat, again, lots of netting is done by riparians, who own the

rest of the river all the way down to the sea, this stretch being entirely unfit for sport.

(6) *Siredal or Sireaaen River.*—The Aænsires Salmon Fishing Company has rented the whole river, some 3 kilomètres in length, for 2100 kroner all the way up to Lunde Lake, and they use it only for catching fish for breeding in the hatchery. The Government pays them 4000 kroner per million eyed ova, which are distributed free on paying forwarding expenses to other salmon rivers. All fish ascending have to pass the lower ladder into a basin where they are caught for breeding purposes. Some 200 or 300 fish are caught this way every season. There is only a very short little beat which might be used for sporting purposes if the fish were not caught for the hatchery.

NAUSDAL RIVER—*Situation.*—Flows into the Fŏrde Fjord.

Route.—By local Sondfjord steamer from Bergen to Naustdal at the mouth of the river.

Description.—This river has a basin of some 280 square kilomètres. It is of inconsiderable size, but is a very sporting river, and well spoken of by men who have fished it. The salmon are small, but the grilse and sea trout are numerous. Within a drive is remarkably good trout fishing, though the trout also are small. The river and trout lakes are both in the possession of a sportsman in Bergen, who lets them, reserving some three weeks in the season for himself.

THE LYNGDAL RIVER—*Situation.*—Flows into the Lyngdals Fjord.

Route.—From Christiansand by local steamer to the mouth of the river.

Description.—This is a sporting little river. The length of fishing water extends to some thirteen miles. For several seasons prior to 1886 this river yielded a very good catch annually. But after that year the ever-increasing amount of nets at the mouth of the river and in the fjord considerably damaged the river. In 1901 and 1902 the nets at the mouth, and also at Solskar, on both sides of the fjord, were bought off, with a view to benefit the rod fishing. Notwithstanding this, the early part of the season of 1902 was a failure. Matters improved somewhat later in the season, but the total catch made on the river in the season was only some 1100 lbs.

The fishing is all done by casting from the banks.

Fish begin to run early in May.

The leases of the river are held by Mr. Beyer.

THE GULA RIVER.

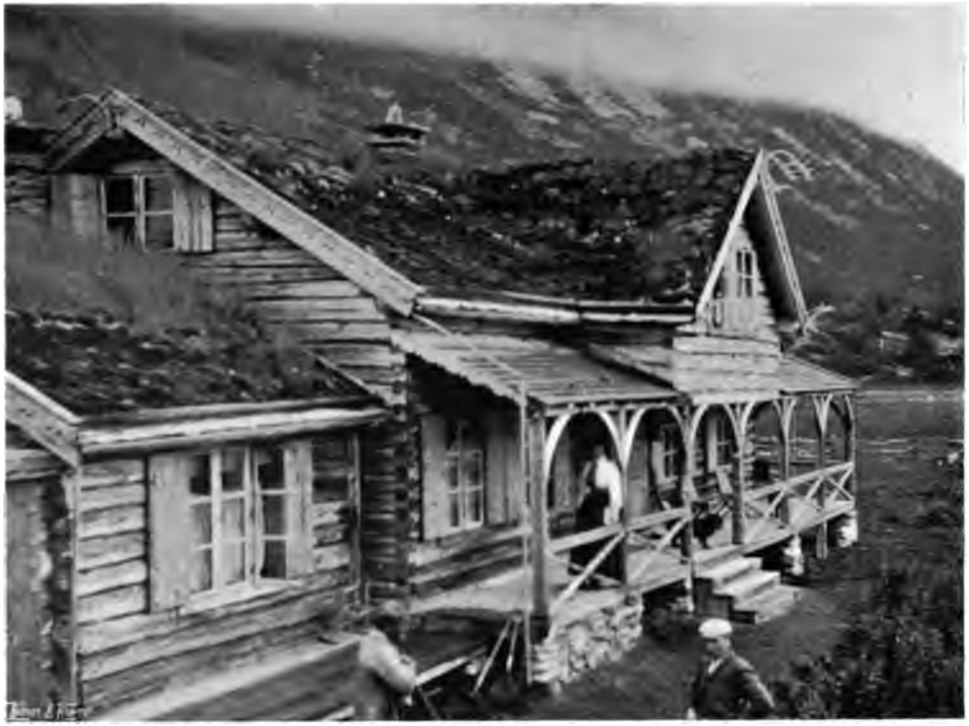
Situation.—Flows into the S.E. corner of the Trondhjem Fjord.

Route.—*Via* Trondhjem or Christiania, thence by rail to various stations on the river.

General Description.—In its general character the Gula closely resembles the beautiful Orkla River. It has the same fine holding pools, separated by swift rapids; both of these, however, as a rule, lack the great pace of current which is found all up the Orkla. The river banks and also its bed are composed of big boulder rocks, shingle, &c., which are found in the favourite haunts of salmon. The actual extent of rod fishing water reaches from Gulfossen to Eggen Foss, a distance of some forty English miles. Below the Gulfos there is a long stretch of slack water, with clay banks, which are liable to constant slides. Thus the lower reaches often look like pea soup, and in the event of any large portions of the banks falling away, as was the case in the early part of the season 1902, it is likely to have a bad effect on the run of fish coming up from the fjord. I make this statement with some hesitation, since it is claimed by certain others that bank slides in the lower reaches do not affect the fishing on the upper waters. But it is hard to explain otherwise why the season of 1902 was a magnificent one on the Orkla, but on the Gula, which flows into the fjord a few miles distant from the former river, the season could only be called a moderate one.

For many years the lowest beats now fished were looked upon by rod anglers as worthless. But recently a number of nets and salmon traps have been bought off there, and rod fishing is now carried on even below the Gulfos. The Gulfos itself is well worth seeing. Close to the railway, a short distance below Storen station, the river narrows down to about a quarter of its width.

Here it has washed a course through the solid rocks for a considerable distance, and coming down a roaring, seething mass of waves and foam, falls with immense force into the great Gulfos Pool below. Looking at it early in 1902, when the river was big, it gave one an idea of a salmon's strength in the water when it was known that fish were daily running through this raging torrent. There is no doubt that in a heavy water season like this numbers of fish hang back for a long time in the pool below the foss. This is the time for the tenant of the Hage beat, where this pool is situated, "to make hay while the sun shines," and to go harling hard and fast there, since this is the only successful mode of fishing the pool in big water. The pools on the Gula may be fished either by casting or harling, but chiefly by the former method, except on the lowest reaches of the river. Most of the fishing is done from a boat, and certain parts of the upper waters by casting from the rocks and banks. Strong rods and tackle, with plenty of line on the reel, are a necessity. Fish run up to a good size, as most years some lucky angler gets a fish of 40 lbs. or over. At present the Gula is divided into about ten beats, of which about half are in private owners' hands, the remainder being leased by Mr. Beyer. In spite of the removal of many nets from the lower reaches the fishing on this river seems to be steadily declining, although it still yields some fine bags. In 1887 two rods, Messrs. Allis Smith



63.—NORWEGIAN FISHING HOUSE.

61.—AN ENGLISH LADY AND HER DAY'S BAG.

and Edgar Goble, fishing on the Õian, Elvenhus, and Bogen beats, from June 23rd to August 4th, killed no less than 1413 lbs. of salmon and grilse, and it is doubtful if any two rods, in the same period and at the same time of year, could now bag half this amount on any beat of the river. As a proof of the above statement, the best recorded catch in 1902 was made on the Hage beat, where the writer had the fishing rights for a short time early in that season, and the total bag for the whole season was 1405 lbs. In former years, when it passed from the hands of Mr. James into those of Mr. E. Goble, the Bogen's House Pool was celebrated for always yielding a good catch, and from records kept by these gentlemen this pool generally produced some 750 lbs. of salmon each season. But since the completion of the Christiania Trondhjem Railway, which runs along the bank of the river, this pool has altered in character, and during the last four seasons the bag there has been very small. The Gula fishes early in the season, generally, in the lower pools, from the first week in June, and is at its best during the latter part of June and the whole of July. The best list of flies is Jock Scott, Black Doctor, Durham Ranger, and Silver Doctor, the last-named being perhaps the most deadly. Very little harling is done except on the lowest reaches of the river, or when the water is thick, and then the usual patterns and sizes of spoons and artificial bait, according to the state of the water, are employed.

THE AARO RIVER.

Situation.—Flows into the Sogne Fjord.

Route.—From Bergen by local steamer, about ten hours.

Description.—This river consists of a small stretch of very heavy water, the total length of fishing water being about one mile, the further ascent of salmon being barred by a series of cascades extending fully 100 yards in length, at a place called "Hell's Vedos," or Devil's Waters. The river is noted for its heavy fish, and added to this the fact of the fast water and strong rapids, the very strongest of rods and tackle are a necessity. Even then a considerable number of fish are lost every season. The fishing is all done casting from the banks, or from wooden stages and platforms erected for this purpose in the best pools. The usual service patterns of flies are used, but always of a very large size whilst the water remains big. It was on this river in 1895 that Mr. Kennedy killed the celebrated 68-lb. fish, a model of which is still on view in Messrs. Hardy's shop in London, which is generally believed to be the largest salmon ever killed in Europe on a rod and line. In 1902 the bag made on the Aaro was 62 salmon, 18 grilse, and 29 sea trout, a total of 1544 lbs. between May 24th and September 14th.

THE AARGARD RIVER.

Situation.—Flows into the Namsen Fjord.

Route.—From Trondhjem to Namsos by coasting steamer.

Description.—This little river, about three miles of which is good for fishing below a foss which the salmon cannot ascend, has yielded a fair catch of salmon and grilse during the last few seasons. In 1902 the bag was some 1250 lbs. during the season. Early in June, when the salmon begin to run up the Namsen Fjord, a number of fish work up and try this river. Doubtless the greater portion of them eventually return to the fjord and then work up the Namsen. Having regard, however, to its small size and short extent, the sport which the river affords is decidedly good. This river is fished partly casting and partly harling. It is leased to Mr. Beyer.

THE SUNDAL RIVER.

Situation.—Rises in the Dovrefjeld, and flows north-west into the Sundals Fjord.

Route.—From Christiansund by local steamer, six hours, up the fjord to Sundalsoren.

General Description.—This river has been so well described by Mr. Dowell in his book, "Norwegian Anglings," that I cannot do better than quote a short extract from it:—

"As regards its watershed, the Sundal River is exceptionally well provided, and, like some other few districts in Norway, it appears to be so situated as regards the winter snow-bearing winds that its cavities and peaks retain the drifts, and thus maintain a supply which keeps the volume of the river to a good height when others less favourably situated have been reduced to summer level for a considerable period.

"The Sundal is fortunate in another respect, viz. the valley is rich in stone, and thus its bed in most pools is plentifully bestrewn with big rocks, boulders, and rough cobbles, interspersed with gravel beds, affording every inducement for fish resting. Pools and rapids alternate with average regularity, and there is little or no slack or flat water. On an average there is probably a pool to each half mile of the river, some very long, which take two or more hours to fish, others probably an hour to cast down; in addition, there are many short catches or good resting places."

Prior to 1885 the river was useless for some years owing to a clay-bank being exposed by the action of the water, and in 1898 the same cause spoilt the fishing below Horfahle bridge for the entire season. This breach has been repaired at considerable expense, but the river is liable to these land slides in big floods. The fishing rights have, however, become so valuable, that repairs would be undertaken at whatever cost.

All the beats on the Sundal, with one exception, the Elverhoi beat, which is owned by Mr. Lort Phillips, are leased by Mr. Beyer.

Mode of Fishing.—Fishing on the Sundal is pretty equally divided, from boat, and by wading, and in a few places from the bank. Some pools can be fished only by wading, some only from the boat, and the choice depends naturally on the height of water. It is almost entirely a casting river, little else being used save the fly.

Flies.—The Durham Ranger, Jock Scott, Silver Doctor, Black Doctor, and Silver Grey will be sufficient, though the Dusty Miller and Gordon may be added. The Durham Ranger is the best. Sizes depend on the state of the water, but a 5/0 is perhaps the most often required.

Fish run up to a good size on this river, as may be judged from the appended catches. In 1897 Colonel S. Hebbert and one other rod, killed on the Hol beat, which is the lowest on the river, 83 salmon, with an average weight of 20 lbs. In 1902 the tenant of the same beat bagged 132 salmon and 17 grilse, with a total weight of 2232 lbs., fishing from June 10th to August 8th.

The best months for fishing are June and July. The lower beats are very good in August for sea trout, but not for salmon, although some of them may be got higher up in this month.

THE LÆRDAL RIVER.

Situation.—The Læra or Lærdal River flows out of two considerable lakes near Nystuen, in the Jotum Fjeld, and runs into the Sogne Fjord.

Route.—From Bergen by local steamer to Laerdalsoren.

General Description.—After leaving the lakes above mentioned the river runs down a course of some 40 or 50 English miles. In its upper reaches it is a good trout stream, but some 15 or 16 miles from the mouth it falls over a foss, which salmon cannot ascend. Compared with most of the best known rivers of Norway it is of inconsiderable volume, but must nevertheless be reckoned one of the best salmon rivers in Europe. Several causes contribute to this. The lakes at the head regulate the water supply, so that it neither floods so readily nor runs out so quickly as most other rivers. The rocky character of the bed, the swiftness of the stream, and the absence of sand, keep the water extremely clear, except in the heaviest floods. The depth of the Sogne Fjord, which is some 170 miles long, precludes the use of nets to any extent. Nor is there any floating timber to annoy the fisherman. The hills are too barren and rocky to grow anything but birch scrub, and if timber was sent down it would be dashed into matchwood in the numerous rocky rapids. From the foss the river runs through a narrow gorge for about three miles to Selthun Bridge. Here are many small pools, some of which cannot be fished with a fly, and most more or less difficult of access. Fish do not get up there till the water falls fairly low, which is usually well into August, owing to the strong rapids below the bridge. Here the valley widens somewhat, and below the rapids is the famous pool Bjorhum, where fish congregate waiting to go up. This is a lovely pool to fish, and is at its best in high water, but nearly always holds fish. It forks at the tail, however, causing not unfrequent disaster. Just above Lysne a smaller stream, the Mo, runs in, but fish do not go up it. Here the valley widens considerably, and lower down again the river is constantly cutting new channels. The character of the stream in the lower reaches becomes wider and shallower, more gravel and less rock, but it is always strong running. For its size it is a deep river, and, however low the water, there are always some pools where fish may be killed.

Mode of Fishing.—The fishing is chiefly fly-casting from the banks, or by wading. The prawn is also very deadly at times.

The following list of flies and the remarks thereon have been furnished the author by one who has often fished this fine river, and who, from his experience and great proficiency with a fly rod, is well able to give advice on the subject.

Flies.—Rangers of various patterns, Benchill, Jock Scott, Butcher, Popham, Poynder, Boyce, and Black Dose. Sizes from 6/0 down to 6 and 7.

There are probably few rivers on which size varies more or is more important. You may kill a fish on a 6/0 in the white water of the rapids, and perhaps another on a 6 not many yards away in a high water pool run out. This is, of course, an extreme case, but every pool requires careful judgment, and what is right for the head is often too big for the tail.

Fish do not run very large in Lærdal: salmon average about 15 lbs., and grilse about 6 lbs. A fish of 30 lbs. is a big one, and few are got of this size.

It is rather a late river. The lower water should fish about June 10th, and the upper water about June 25th. The latter part often fishes well right up to the end of the season. Previous to 1890 a great part of Lærdal was held by Mr. Musters, but in that season the Hon. E. Portman bought nearly the whole of the fishing rights on the river, and these he held till 1897, when certain rights passed into other hands. At present part of the river remains in Mr. Portman's hands, and a part is leased by Mr. Gran, of Bergen.

THE MANDAL RIVER.

Situation.—Flows direct into the sea without any intermediate fjord at Mandal.

Route.—From Christiansand by local steamer about four hours to Mandal, or drive across country from Christiansand to the middle beats.

Description.—The Mandal has a basin of some 1760 square kilomètres. Its source is on the plateau of the Langfjeldene, and in the early parts of the season the snow remains there, generally keeping the river well up until well on in June. Later than this month the amount of water is very uncertain. Salmon ascend the river as far as Foss-Foss, a distance of some 55 kilomètres; beyond this foss they are unable to run. Many years ago the Mandal was considered amongst the best class of Norwegian rivers. For a great number of years nets and salmon traps were freely used in the river, and the rod fishing was practically ruined. In 1899, however, great efforts were made to redeem its lost reputation, and the complete withdrawal of all nets and traps was accomplished. The result has certainly improved the catches made by rods, since in 1898, when the nets were still in force, the total number of fish taken by rods was 80, with a total weight of 471 lbs. on the whole river. In 1899, however, these totals were raised to 1392 fish, weighing 6245 lbs., and in 1900 the total weight recorded was 9014 lbs., since which date the last total has not been beaten. These results are fairly satisfactory, but a total of some 9000 lbs. caught on a river of the size of the Mandal is far below what it should yield, especially when it is considered that there is no long fjord at the mouth of the river, where the fish have to run the gauntlet of swarms of nets, as they do in most other rivers. The season of 1901 showed a marked falling off owing to the dry season, and in 1902 the former marked increasing improvement was not maintained, partly owing to some beats being unlet, so it is to be feared that the most sanguine hopes of those who looked for a return of its palmy days may not be fulfilled. A few more seasons, however, may suffice to prove this, since nothing is so uncertain as the average Norwegian river. The river itself is of such a nature as to offer salmon every inducement to frequent it. It contains numerous pools and runs, such as are dearly beloved by salmon and fishermen alike.

This river is amongst the earliest to come in fishing order in Norway. The season extends from May 1st to September 30th, with the exception of the two lowest beats, where the season ends on September 14th. There is one great advantage attached to the river, namely, that it can be reached in about 36 hours from England, this being the shortest time in which one can hope to reach any Norwegian river. The river is at present divided into about nine beats, the leases of which are all held by Mr. Beyer. Fish do not run big on the Mandal, the capture of a 30-pounder being a rare event. On the upper reaches of the river the fishing is mostly casting from the boat and banks, but on the lower reaches a good lot of harling is done. As the run of salmon is early the first part of the season is decidedly the best on the Mandal, and, except for grilse and sea trout, which are numerous, the back end of its season is not as good as the first two months after the fish begin to ascend.

THE NAMSEN RIVER.

Situation.—Rising far in the interior of Norway it flows in a south-westerly direction into the Namsen Fjord.

Route.—By Wilson Line from Hull to Trondhjem. From Trondhjem to Namsos by local coasting steamer, about 18 to 22 hours' passage through the fjords. From the village of Namsos drive by carioles up the valley of the river.

A new railway from Trondhjem to Stenkjer, by Levanger, will shortly be available for access to the Namsen.

General Description of River.—The Namsen is one of the largest and most celebrated rivers in Norway. Its fame is chiefly owing to the regularity with which this river produces a good yield of fish, irrespective of the extreme variations of dry or wet seasons to which the climate of Norway is subject, and also to the fact that the average weight of fish caught is very heavy. The river is entirely snow-fed, and, owing to its northerly situation and the vast area which it drains, dead low water is unknown, in which respect it holds a strong advantage over many other Norwegian rivers.

The salmon can run up as far as Fiskum Foss, which is an immense and very fine waterfall, about 50 miles above the small town of Namsos at the mouth of the river, and here the falls prevent the further ascent of salmon up the river, although many fishermen, content with the more modest form of trout fishing, push on beyond the foss for this sport. The lower reaches of the river up to the foss at Lillieoen, a distance of about 15 miles, are too sluggish and too much affected by the tide to be used for rod fishing, with the exception of two good pools just below the foss, and here the hateful "Laxegar" (or fixed nets) may be seen freely displayed, waiting to end the days of many a luckless salmon, which, once he enters these death-traps, will never more live to give the patient rod anglers on the upper reaches a trial of their skill and soundness of tackle.

As regards the general nature of its stream the Namsen may be called a slow-running river, particularly on the three or four lowest beats. The bottom is mostly composed of gravel and sand, and is very free of big rocks and snags.

The mode of fishing is almost entirely harling, although on two of the lower beats there are several small casts, where the writer and others have had good sport casting from the boat and from the rocks. These happy places are a spot called the Fossrock at Bibstad, and three good casts on the Selloeg beat, notably one at the very lip of the Lillieoen Foss. When the salmon are running fresh from the sea this foss is the first obstacle which the fish encounter on their upward run. Many of them rest a while just above the foss after surmounting it, as it were to take a slight "breather" after their effort of running through the heavy water. Here then, by holding a boat some distance above the foss, many a kindly disposed fish can be enticed to take a fly whilst resting, and if it so be that he should take it into his head to rush down over the foss again, as they often do, then the fun begins, for the only resource left to the angler is to land at once on the nearest bank, as no boat can shoot the foss in high water, and race round to the tail of the Foss Pool, where he may hope to get on terms with his fish, and to reel up the inevitable bag in his line, which will always be found on reaching the tail of this huge Foss Pool. The pool is 300 yards long and 200 yards wide, and necessitates a good scramble over slippery rocks to get round in time to save the angler from the unwelcome sight of the end of his line on the reel.

There is no need to describe the method of harling on the Namsen as distinct from that practised on other rivers, with the exception that two boatmen are employed in each boat, at the wages of 3 kroners each per diem. As a rule two rods, and often three, are used from each boat, the best form of rod being a 14-feet greenheart harling rod, as supplied by Messrs. Hardy and other good makers. For harling, a good-sized reel with a strong check is the best. Hardy's Perfect Reel, size 4¾ inches, will be found excellent for this purpose. As the Namsen is very wide in places a line not less than 180 to 200 yards long should be used when fishing the broad reaches. Strong traces, of either treble gut or drawn steel, should be used with swivels.

The best lures depend entirely on the state of the water and the time of year. Early in the season a sprat, gudgeon, or dace is generally a very killing bait, and one of these should always be tried on one rod up till the end of July, after which these baits are not so deadly as the spoon and the fly, either of which may be used on the other rods. The best patterns of spoons are made locally in the village of Overhalden, on the Namsen, and can be obtained there. Some are silver outside and copper on the inner side, others all silver, the latter being perhaps the more deadly. Early in the season, and in heavy or thick water, the largest-sized spoons are used, but later on the smaller sizes are best.

The subject of flies is always a large and difficult one to tackle, but, to put it briefly, at the beginning of the season and in heavy water sizes of 6/0 and 5/0 will be found the best. When the water gets clear, and the grilse begin to run, the bag will be greater if sizes of 2/0 and smaller are used. Speaking from personal experience I have no hesitation in placing the Dusty Miller as *facile princeps*, and next to it the Black Doctor, Jock Scott, and Popham; whilst, for casting early in the season, the Grey Eagle and Yellow Eagle are often deadly in this slow stream.

As regards the division of the Namsen into various beats, it has been considerably cut up of recent years, compared with the extent of water fished by the old pioneers of the river in former days. The beats now vary in size from about 4 to 8 kilomètres, and the rents asked for each vary according to its length and to the previous catches made upon it. The total number of beats from Fiskum Foss to Lillieoen Foss is now fourteen in all, of which seven are in private hands, and the remaining seven beats are the property of Mr. Beyer, of Bergen.

The accommodation in the houses of the Namdalen is excellent, and the convenience of having a perfect telephone system laid on to each house, and thence all over Norway, is great.

The actual expenses, over and above the rent, are a charge of 2 kroners per head per diem for living in the farm-houses, 3 kroners per man for each boatman employed, and the wages of a good Norwegian cook, say 2 kroners per diem.

The capture of a 40, or even an occasional 50-pounder, is no rare occurrence on the Namsen. Amongst the most notable captures of big fish on this river in recent years are the three following:—One fish of 64 lbs., killed by Mr. Merthyr Guest on Gartland beat a few years ago; one fish of 58 lbs., killed at Bibstad in 1902 by a boatman; and a fish of 53½ lbs., killed by a lady, Mrs. E. Radclyffe, on Selloeg beat, 1901.

As an example of what a good Namsen beat can yield, I quote the catch made in 1902 on the Bibstad beat by my friends and self, and the farmers fishing in the absence of English tenants. The bag is good, considering that 1902 was called a bad season on the Namsen. Unfortunately I have not the details, but the total weight of salmon, grilse, and sea trout was 2905 lbs.

The Namsen has one important tributary called the Bjora, which flows in a little above the village of Overhalden. This river, with its upper water, which is called the Soraaen River, affords fairly good sport, both harling and casting, and in certain seasons the three beats on the Bjora have yielded good bags. It suffers, however, from two defects, the first being that although the salmon will rise freely to small-sized flies the current is very dead, and the fly requires a lot of working to keep it moving. Also many of the pools are full of snags, and one in particular, which has been responsible for many lost fish and broken casts, is known to the old hands on this river by the very appropriate name of "The Tackle Shop," owing to the amount of casts, &c., still hanging in different parts of the pool.

The best months for fishing on the Namsen are June and July. But in August there is generally a heavy run of grilse and sea trout, with a certain number of fresh-run salmon coming up.

THE ORKLA RIVER.

Situation.—Flows into the S.W. corner of the Trondhjem Fjord.

Route.—Via Hull and Trondhjem, and from Trondhjem to Orkedalsoren, a small town at the mouth of the river, three hours by boat from Trondhjem.

General Description of River.—The Orkla is somewhat similar in character to its sister river, the Gula, though slightly smaller in size. The whole of the best fishing water may be reckoned as extending from a few pools below Aarlivold Bridge, about 16 miles above Orkedalsoren, to the upper portion of the Grut beat. Between these two points the river is at present divided into six beats, of which four belong to members of the Anglo-Norwegian Fishermen's Association, and the remaining two beats to Mr. Beyer, of Bergen. In former years the average bag on each beat of the Orkla would compare favourably with that on most Norwegian rivers. But perhaps to-day there are ten nets in the Trondhjem Fjord where in those times there was one. Nevertheless, that it still remains a good river may be judged from a glance at some of the catches quoted below, which were made in 1902. As regards its general character it would be hard to find a more sporting river in the whole country. The pools are deep enough to afford good holding places for salmon, and most of them are filled with big rocks, which form grand resting-places for the fish. The whole river consists of a succession of pools, divided by swift and shallow rapids. So strong are these rapids, that if a boat is once taken out of one pool and down into the next one, it is quite impossible to get back again in the boat to the pool above. Consequently, if a fish is hooked at the head of a pool, it is an important thing for the angler to bear in mind that if possible he should keep it there, so as to avoid being towed down and out of the pool, thereby often missing a lot of good water for the day. In cases of foul-hooked fish, or with heavy fish on light tackle, this often cannot be avoided. Then indeed is the time to hear the reel screaming, if a good fish makes up its mind to leave one pool and go racing down the rapid (often 200 or 300 yards in length) into the one below. Then comes the exciting moment, when the boatman must work his best and hardest if you have no desire to lose your fish, your cast, and often a great part of the line off the reel.

Many a small fish, if foul-hooked in this rapid river, makes a tremendous fight before it is brought to the gaff. An amusing instance of this is quoted, which occurred a few years ago, when one of the oldest hands on the river came home one evening very annoyed and full of an account of a dreadful tussle which he had gone through with a reputed 40-pounder, the fish having raced down from one pool to another, spoiling many of the best pools for the day, and finally breaking the cast. 40-pounders are by no means common in the Orkla, and consequently the loss of this fish was looked upon by the party on that beat as a great disaster. How long the fish would have remained at 40 lbs., or larger, history does not relate, but the fact remains that two days later a man arrived with a fish which had been killed in the nets at the mouth of the river, and firmly stuck in it, slightly above the tail, was the identical fly and cast lost in the aforesaid fish, of which the actual weight was slightly over 10 lbs.

Fishing on the Orkla is entirely done from a boat. No wading or bank casting is possible, owing to the swiftness of the stream and the heavily wooded state of the river banks. Speaking from personal experience, and from that of older hands on the river, I have no hesitation in quoting the following list of flies as the best for casting:—

(1) The Baron, with silver body; (2) The Jock Scott; (3) Durham Ranger; (4) Dusty Miller.

Early in the season and in heavy water sizes of 7/0 and 6/0 will be found the best. During the months of June and the early part of July 1902 it was seldom advisable to employ sizes smaller than 4/0. But in low and clear water the sizes employed are naturally much smaller. Owing to the heavy water and number of snags in the pools, a treble twist cast will be found the best until the water gets very low and clear. Rods may be of any size, to suit their owner's taste, but anything shorter than one of 17 or 18 feet is not advisable for this river, on which many of the casts require a very long line. The fishing is almost entirely fly casting, although certain pools have been harled on occasions when a spoon or minnow have been used in very thick water, &c.

The season of 1902 on the Orkla was remarkable for the heavy snowfall in the preceding winter, and the consequent big water throughout June and July. Added to this there were vast shoals of herrings early in the season in the Trondhjem Fjord, at the mouth of the river. These two facts tended to bring up a big run of fish. But whether it was owing to the coldness of the water or its great force, and the consequent difficulty which the fish experienced in running up the different rapids, I cannot say, but the fish worked up very slowly in the early part of the season, and hung about very much more than usual in the lowest reaches of the river. In a low water season the reverse of this is the case, and a better example cannot be given than that of the seasons 1901, when the water was low, and 1902, when it was high.

The lowest beat, which is called Aarlivold, was rented in 1901, and again in 1902, by Colonel S. Hebbert. In 1901 the bag was 2 salmon, 11 grilse, and 3 sea trout, the total weight 113 lbs.; but in 1902 the bags on this beat, made by Colonel Hebbert and Mr. A. Sheridan, was 156 salmon, 99 grilse, 12 sea trout, total weight 2718 lbs., in June and July.

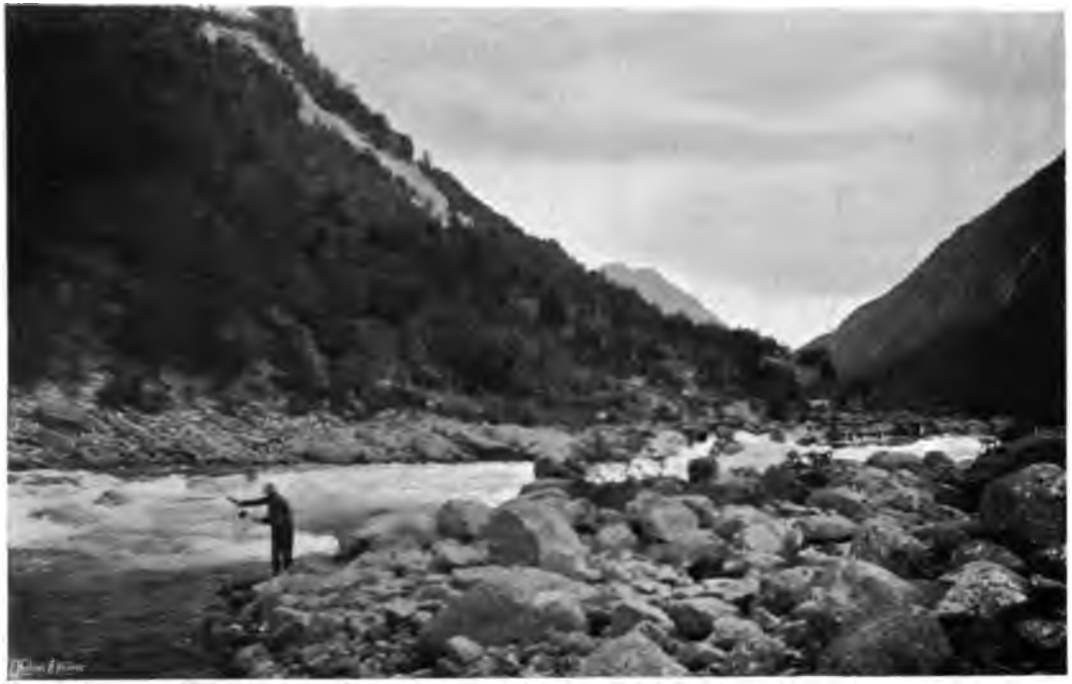
The run of grilse and sea trout is not very heavy on the Orkla, except on the lower reaches of the river. The two best months for fishing are June and July, and fish have often been killed there during the last week in May. The fishing may be said to practically finish here at the end of July, as in most seasons the river is then dead low, and there is no real run of salmon afterwards, although a few red fish and grilse may be taken in August.

THE SAND RIVER, or SULEDAL ELV.

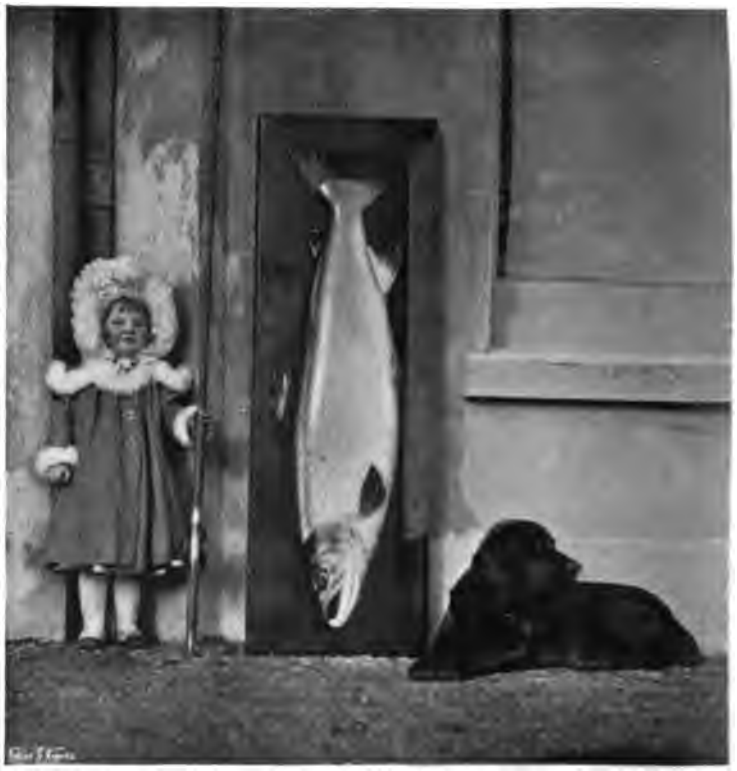
Situation.—Flows into the Sands Fjord, near Stavanger.

Route.—From Stavanger by local steamer.

Description.—This river, although not in the



65.—HEAD OF STOR POOL, NORWAY.



66.—COMPARATIVE ANATOMY.

first class as regards size, is the largest between the Sireaan and the Vos, and may be looked upon as a very good one. It issues from a large lake, and flows a distance of 14 miles into the fjord. No great distance from its mouth there is a foss, below which there is a celebrated pool where fish are stopped early in the season. For many years the water below the foss was regularly netted. The nets have now been removed, and, in consequence, the water below the foss affords good sport harling. The fishing in the early part of the season is practically confined to two or three pools near the lower foss, as fish hang about there waiting until the level of the water suits them to run up as far as a second foss, which is situated some two miles higher up the river. Between this and the lake are some long and fierce rapids. The fishing on the upper pools is best late in the season, from mid July and onwards, when very good sport may be had there. The river is fished partly by casting from a boat and from the banks, and also by harling certain pools. The two best flies, in the opinion of a sportsman who has killed a number of fish there with them, are the Wilkinson and Black Doctor. Fish generally begin to run about the second week in June. They average a good weight throughout the season, and often run up to big weights—fish of 40 lbs. and over have been killed there. The prawn has often been used with good results on certain pools in this river. There is generally a good run of grilse during the season. The river is owned by Mr. Archer, a well-known English sportsman, and by his friends, who have been fortunate enough to secure long leases of this sporting river.

THE SURENDAL RIVER.

Situation.—Flows into the Surendals Fjord, near Christiansund.

Route.—From Christiansund by local steamer.

Description.—This river extends from the fjord to the foss, a distance of some 12 miles. It is dependent entirely on glacier water, and a good snow year. The river contains a number of very sporting pools which are peculiar in one respect, although the peculiarity is by no means limited to this river only. In nearly every pool there is a particular stone or rock behind which the fish lie. There only does the angler who knows each pool hope to move a fish. So certain are these spots for producing a fish that I have been informed it is safe to lay odds on moving a fish with two or three casts in these places, if there is one in the pool and inclined to move at all. The fishing is all fly casting from a boat; the best flies being the Durham Ranger, Butcher, Black and Silver Doctor. Fish begin to run early in June, the first run of fish being always big fish. There are several runs of fish during the season, each lot gradually decreasing in size. The river is owned by Colonel Whitmore.

THE VEFSEN RIVER.

Situation.—Flows into the Vefsen Fjord.

Route.—From Trondhjem by coasting steamer.

Description.—This fine river, which has its sources in the Börge Fjeld, flows nearly due north into the fjord. It is a river of large size, and drains a considerable area of country, its catchment basin being nearly 40 square Norsk miles, or about 4800 square kilomètres. For many years the greater part of the rod fishing was carried on in the lower reaches of the river, as the fish were kept back there by some bad fosses. These have now been made passable for salmon, and consequently the upper reaches now hold fish, but not, as a rule, before the first or second week in July. For many years the three best beats on the river have been held by three sportsmen, who are fortunate to have secured long leases of the water. The lowest beat, called Stjernberg, is held by Mr. R. Venables Kyrke. Above this comes a beat of some three miles in extent, which includes the celebrated Foss Pool below Forsjord Foss. This beat is held by Major Chadwick, and is a particularly fine stretch of harling water. Above Forsjord Foss comes another fine stretch of water, extending some eight or ten miles to another big foss, called Laksfoss. This beat is held by Mr. Kyrke and Colonel W. E. Brymer. To Mr. Kyrke a considerable amount of credit is due for the improvement of the Vefsen. At no inconsiderable trouble and expense, he has erected a ladder at Forsjord Foss, up which salmon can ascend in high water. There has been a Government pass there for some time, but as it is merely a hole cut in the rock, it was impassable for fish in a heavy head of water. Thus, not only has the stretch of water as far as Laksfos been improved, but also the beats above that foss, since passes have also been made there recently. The fishing on the beats from Laksfos downwards is principally done by harling, for which the "service pattern" spoons, &c., are used, according to the state of the water. Above Forsjord Foss, however, a good many fish have been killed on the fly, and the best patterns for this river may be classed as follows, according to particulars supplied to the writer by one of the most experienced anglers on the river. The Durham Ranger is a great favourite. Silver Doctor and Dusty Miller are good for bright weather, and the Jock Scott is good at any time. The Black Dose and Black Doctor are excellent for night and evening fishing, and also the Alexandra. Blue-bodied flies are not good. Like all northern rivers, the run of fish is late on the Vefsen, and the river is at its best during July. Salmon run up to big weights, but, as the author has observed on other Norwegian rivers, the heaviest fish are generally taken on the lower reaches, the very heavy fish evidently not liking the knocking about which they receive in running over the fosses and salmon passes. Fish have been taken on Major Chadwick's beat up to 53 lbs.

weight, but above Forsjord Foss the heaviest fish on record appears to be 43 lbs., although many have been taken there of 40 lbs. and over.

In these days when, owing to the shyness of fish, it is desirable to use the most invisible tackle possible to find, the wire trace has been largely adopted for harling. It may interest some fishermen to know that Mr. Kyrke was the first man to introduce them into Norway, and for that matter the first to use them anywhere. These single wire traces were the invention of a watchmaker, Henry Horwood of Killin, on Loch Tay, who sold some to an old salmon-fisher there, but he was afraid to try them, and gave one to Mr. Kyrke, who used it with the greatest success on Loch Tay, and killed fish with it day after day, whilst other men were returning after a blank day with the old-fashioned gut traces. Such being the case, it is not to be wondered at that he was not slow in taking them out to Norway, and there the results so justified his expectations and those of other anglers who used them that it is no wonder the wire trace is now rapidly superseding all others for harling.

THE REISON RIVER.

Situation.—Flows into a branch of the Kvenang Fjord.

Route.—Via Trondhjem and Tromso by coasting steamer.

Description.—This river is of some considerable length, and extends a distance of about 60 English miles. The lower reaches for 15 miles or more are for the greater part only good for sea trout. Above this there are a number of sporting pools covering a distance of 30 miles which have produced fair sport, although the salmon run small. As is the case with all the rivers far north, the fish run late, generally not till July. The fishing is all done casting, and much of it from a small boat or kind of canoe, peculiar to rivers in that part of the world. Very small flies are used. A lease of the river is held by Mr. Beyer.

THE ALTEN RIVER.

Situation.—Flows into the Alten Fjord, which is some distance N. of Tromso.

Description.—No article on the rivers of Norway would be complete without a passing mention of this river, but since it is the desire of the present owner that too many facts concerning it should not be made public, the writer is bound to respect this wish. The river has its source in some small lakes far in the interior, and flowing due north it drains a large area of country; its catchment basin being some 54 square Norse miles, or nearly 6600 square kilomètres. The Alten may safely be called the most celebrated river in Norway as regards its yield of fish, &c. There is only one river in the knowledge of the writer, situated in Europe, which could yield a bag anything approaching that made on the Alten each year, and this river still remains as little known now, owing to its remoteness, as the Alten was for many years in former times. The district round the Alten Fjord is remarkable for being the most northern point of the globe where agriculture is carried on. When we compare the climate on the west coast of Norway with that in other parts of the world, it is wonderful to think that here fishing is regularly carried on, in a spot north of the line where Sir John Franklin's ships were abandoned, after having been icebound for a period of eighteen months; while Dr. Nansen's journey in 1888 across the icefields and unexplored plateaux of Greenland lies 350 miles farther south. The river has had rather an eventful history as regards the troubles of some of its former owners, but the facts are so well known to the majority of the old hands who annually visit Norway, that it is unnecessary to detail them here. Suffice it, however, to say that the river is now held on a long lease by Mr. Reginald Corbet, a well-known sportsman, whose father took over the river some years ago after it had been held for a time by Mr. Lister Kay. Writing to the author on the subject of this river not long since, Mr. Corbet says: "There is one thing that happens to the northern rivers which many people do not know. A big ice flood can so destroy the spawning beds that the river may-fish very badly for several years. Also a very high river at spawning time can do the same thing. When winter comes the river gets low, and all the spawn is either in ice or on dry land. This happened to the Alten and spoilt the fishing for five years. Now that the nets have so much increased, it takes a long time to recover."

THE DALE RIVER.

The Dale, or Dalselven, which is reached by rail from Bergen on the Vos Railway, has its source in a good-sized lake of some 10 square kilomètres. It drains an area of 218 square kilomètres of country, and flows into the Sör Fjord. Some years ago the river yielded a fairly good bag to the fly, when it was held by Mr. Partridge, who had it for a number of seasons, and I believe he considered 1000 lbs. to his own rod was an average good season. The fishing is all done from the banks. A few years since the river suffered badly owing to pollution from a wool mill on its banks, but recently this has been stopped and the river is improving again.

THE ODDA RIVER.

This small river flows into the Sörfjorden in the Hardanger Fjord. It fishes late in the season, and has never given good results.

THE EIDFJORD RIVER.

This is a very short little river flowing into the Eid Fjord, in the east corner of the Hardanger Fjord. It fishes fairly well some seasons. The fishing is done from the banks, and is very difficult, as the river bed is strewn with boulders and snags throughout.

THE BIRKREIM RIVER.

This river is reached by rail from Stavanger, whence it is four hours' journey to Egersund at the mouth. It issues from a lake at Bjerkreim and flows through another lake not far from its mouth. In extent it is some twelve miles of water. The fishing is partly from a boat and partly from the bank, and is all casting. It cannot be called a good river, as the fish run small and are not numerous. It has yielded very small bags in recent seasons. The leases are held by Mr. Beyer.

THE STRYN RIVER.

Situation. — Flows into the E. corner of the Nordfjord.

Route.—From Bergen by local fjord steamer.

Description.—The Stryn has its source on a big glacier, and after passing through a large lake, it follows a course of some 10 kilomètres down to the fjord. It is a very sporting river, and is decidedly a good one in every way. The following words from the pen of another writer on this river gives a good idea of its general character :—" Its blue-green waters hurry down in rapids through which it is difficult to follow a fish, over fosses where it is impossible to follow one, and then find out for themselves a quieter course, winding under scrubby wood-banks covered with oak fern, and past meadows where lily of the valley grows literally by the acre."

The upper reaches of the river which are the most sporting fishing, are chiefly fished by casting from the banks, or by using a prawn and the spoon, according to the state of the water. In certain places where the current is not too strong to admit of their use, boats are used when casting some of the pools. Fish run up to a good size, weights of 40 lbs. and over not being uncommon.

THE NORDFJORDEID RIVER.

This is a short river falling into the Nordfjord and flowing out of a very big lake. The fishing is all done by casting from the banks. The river is remarkable for the exceeding clearness of its water, probably owing to its filtering slowly through the lake. Fish run small in this river.

THE ETNE RIVER.

Situation.—Flows into the S.W. corner of the Skaanevik Fjord.

Route.—From Stavanger by steamer to Sandeid, thence drive fifteen miles.

Description.—This is a sporting little river, some five miles in extent. The fishing is principally done by casting from the banks, and in certain places by wading. The river fishes early, as salmon generally begin to run early in May. They do not run to big weights, but average about 13 or 14 lbs. In 1902 the total bag on the river was 736 lbs. of fish. The river is leased by Mr. Beyer.

THE GLOPPEN RIVER.

This river flows out of a large lake, and thence into the Gloppen Fjord, which is in the Nordfjord. It is a pretty and sporting river, some six or seven miles in extent. There are two fosses which bar the ascent of salmon, and in order to facilitate this, salmon passes have been erected over them. The fishing is all done by casting from the banks. Fish do not average a big weight, and the run is generally a late one. The river is leased by Mr. Safford.

THE AARDAL RIVER (SÖGNE FJORD).

This river is only a small one, with a stretch of about one mile of angling water. It is almost entirely a sea trout river.

THE AURLAND RIVER.

This is another small river in the Sögne Fjord, and is chiefly a sea trout river.

THE RAUMA RIVER.

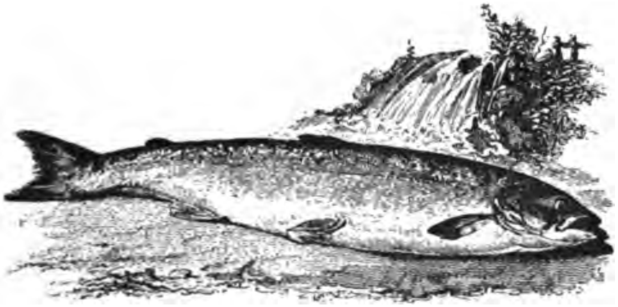
Situation.—Flows into the Romsdals Fjord near Molde.

The Rauma has been so well described in Mr. Bromley Davenport's book on Sport, that any description by the present writer could not add anything to what has already been written. The greater portion of the best water on the Rauma is now held by Colonel Bromley Davenport. A portion is also leased by Mr. Beyer, and there is also the hotel at Holgenaes, which has acquired the fishing rights over part of the river as an extra inducement to its visitors. Although the fishing is not particularly good there, I do not know of any other hotel in Norway which can boast of having any moderate salmon fishing to offer in this manner. Taken as a whole, the Rauma cannot be called at present a good river, more particularly on those portions of it where a stranger is likely to get any fishing on it.

THE FUST RIVER.

Situation.—Flows into the Vefsen Fjord.

Description.—The river is some six miles in extent, and is very good for both salmon and sea trout. As compared with the Vefsen it is a small river. About four and a half miles from the mouth there is a foss over which a pass has been constructed, but fish do not ascend it much before the middle of July. In character the stream is very rapid, and two men are required to hold a boat when casting from it. About two miles of the river is more or less unfishable. A good part of it may be cast from the banks. Flies of similar pattern to those used on the Vefsen are the best. Salmon run to a large size, fish of 40 lbs. and over having been killed there. It is a very sporting river, and the numerous sea trout run large. There are a great number of trout running up to 3 lbs., and these rise freely to a fly, the one and a half miles of water above the foss, and between a chain of lakes at the head of the river, being a particularly fine stretch of trout fishing water. There are numbers of char in the lakes. The salmon rise freely to a fly, but like many others the river fishes best in a high water.



CHAPTER XIII

SALMON FISHING IN THE ESTUARIES

By J. W. Willis Bund

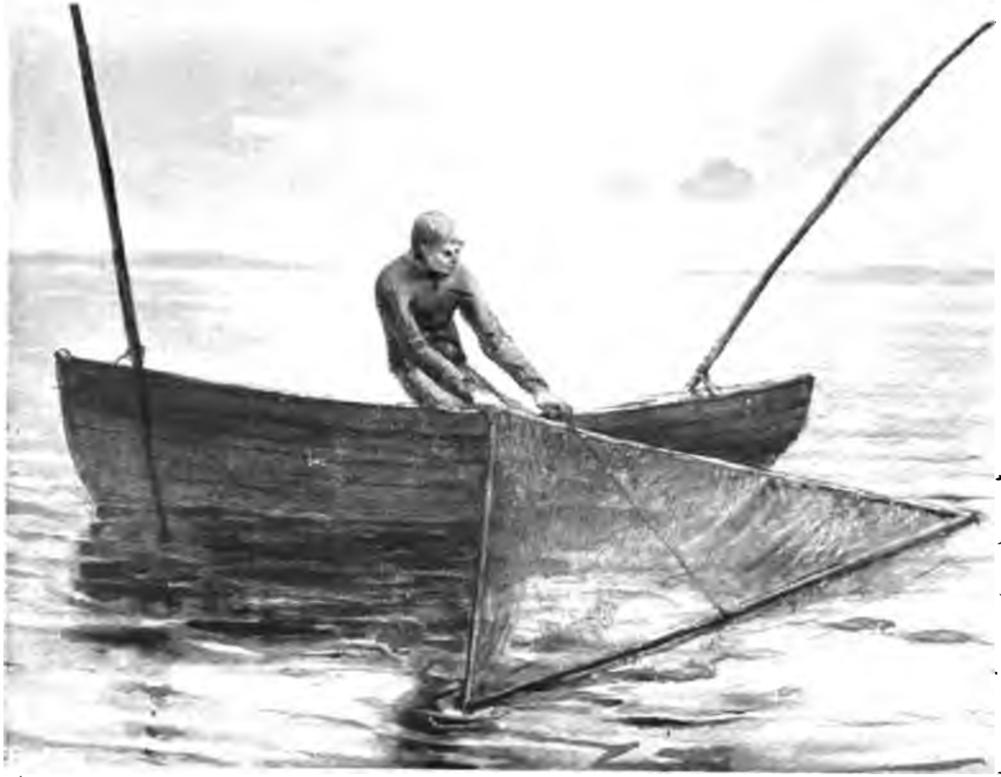
Probably so far as the market is concerned, the best salmon are those caught in the estuary, fish that have left the sea, entered the estuary, and are waiting for some rise of the water to induce them to ascend into the rivers. These fish go backwards and forwards with each tide, and it is while they do this, and hang about the estuaries, that so large a toll of them is taken by the lower fishermen, a matter which always rouses the wrath of the upper proprietor. People do not take the trouble to learn how these fish are caught, the fact that they are caught is enough for them. The mode varies in different places, according to the nature of the place. An account of what is done in the Severn estuary, where annually a large, possibly too large, number of salmon are caught, may be of some interest, even to those who may not be tempted to try a most sporting mode of fishing.

The estuary is a large one. The main part of the fishing takes place roughly between the Severn Tunnel and the Severn Bridge, a distance of some fifteen miles, the river having a varying width of between half a mile and three miles. At high tide all this width is a sheet of water; at low tide it consists of a collection of sandbanks, intersected by channels of varying widths and depths. The salmon run up the estuary each tide, and go back when the tide turns. There is comparatively little fishing to intercept the ascending fish, the descending are those that are mostly caught.

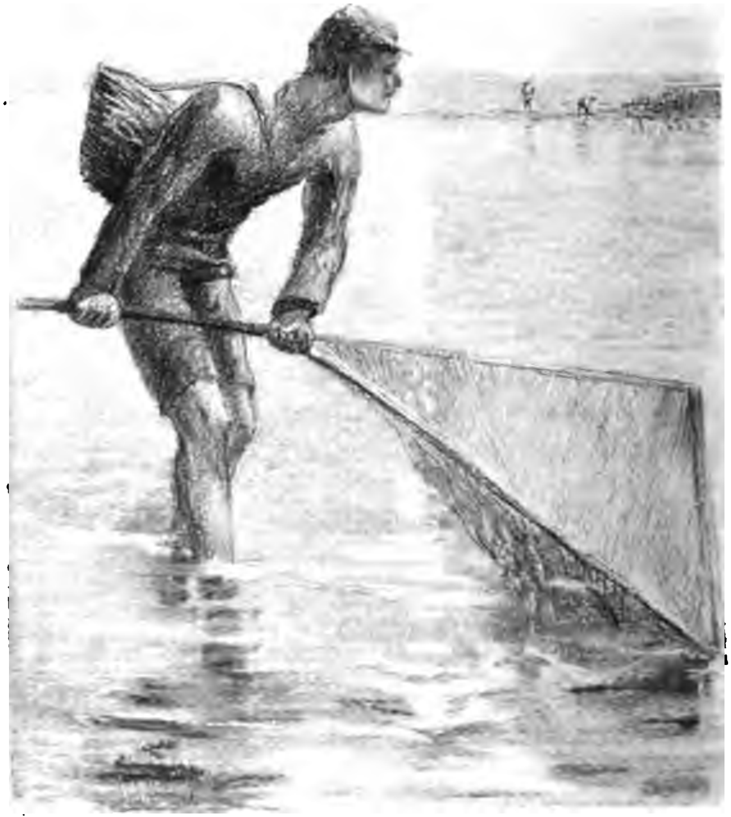
From some cause, probably from the set of the tide, only certain of the channels are used by the fish. In some a casual fish accidentally appears, but others are their usual routes, and are as frequented as certain footpaths or short cuts. Some are frequented by the ascending, some by the descending fish. Experience has shown the fisherman which of these places to select.

As to the ascending fish, the channels they use are usually the deepest, those that feel the flood-tide first. These channels are mainly fished by what are known as "stop-nets." A boat is moored in the channel, at right angles to the stream, a very large "V"-shaped net is put over the side of the boat, the apex of the "V" is in the fisherman's hand in the boat, the end of each arm on the bed of the river. The net has a long loop or purse, which is allowed to run with the stream. To the end of the net a cord is attached, which the fisherman holds in his hand. A salmon striking the side of the net causes the cord to vibrate; the fisherman on feeling this at once presses down the apex of the "V," and the net comes up with or without the salmon in it. This is the theory. As soon as the fish hits the net he at once drops backward down stream, and the art consists in being quick enough to catch him before he drops below the mouth of the net. It sounds very easy, but is by no means so easy as it sounds. The most experienced fishermen often miss. The salmon as soon as he touches the net is off, and it takes a very watchful man to *at once* lift his net when he feels a fish strike. If the fish are running in any numbers a stop-net is a most deadly engine in the hands of a skilled fisherman. But he must be skilled, the fish always come when the fisherman does not expect them and is thinking of something else, lighting his pipe, or not attending to his fishing.

One advantage or disadvantage of a stop-net is that it fishes equally well the ebb or the flood. It is true the same spot does not do for both, but as soon as the run of flood fish ceases and the tide turns the stop-net man goes out to his ebb station and begins again for the ebb fish; thus he catches his fish both ways. Fortunately, the Courts have held that stop-nets are fixed engines, so that none that were not in use before 1861 can now be legally used;



67 —A STOP-NET



68.—LAVE-NET.

but those that exist are, in skilled hands, possibly the most deadly form of estuary fishing.

Next to stop-nets the only other way of taking ascending fish on the flood is by putchers. A putcher is a conical-shaped basket about 4 feet long and from 10 to 18 inches wide at the mouth, looking more like a gigantic extinguisher than anything else. These are placed in ranks, one above the other, the rank extending into the channel. Some ranks have only 30 to 50 putchers, others 1000 and over; but, whatever the number, the principle on which they fish is the same. The strong current at the place where they are fixed washes the salmon into them. When once in he cannot get back and is drowned. Some ranks of putchers have a long fence leading up to them, the object being to guide the fish down the channel to where the strong stream takes them into the putchers. A very few of these putchers fish on the flood, that is, are placed to catch the ascending fish; but this is only in some place where the nature of the channel compels the fish to pass through one small space, by far the larger number fish the ebb. The great objection to putchers is that they catch all sorts of salmon, good and bad alike, and all salmon caught are killed, as the fish are drowned and the putchers can only be examined when the tide has dropped low enough for them to be reached either in a boat or from the shore. The quality of the fish for table is not improved by its remaining so long in the water dead; and this may be the reason that there are so few flood putchers, as the fish would have to remain dead in them for some hours. As putchers can only be used in the same place in which they were used in 1861, and as the channel often alters, the value of the putcher fishing is not what it once was; still there are every year some 6000 laid down in the Severn district. There is no particular skill in placing them, except to make the smallest possible number do the largest amount of fishing, as the licence duty is levied on the number used. Putcher fishing has one disadvantage: the owner very often does not get his catch. Regular putcher thieves will go round in a boat and search the putcher for a fish before the owner can get out from the land. And even if the thieves are absent, if a fish is in a putcher, both gulls and carrion crows are not above seeing if they cannot have a meal, thus injuring the fish for the market.

Somewhat analogous to putchers are putts, large wicker baskets about eight feet or so high at the mouth, and running down to a diameter of some six inches at the narrowest part, called the forewheel. They seldom actually catch a salmon, but being placed at certain spots where salmon would pass on descending the river they obstruct the passage of the fish, and cause them to remain in pools on the rocks, which run nearly dry or very shallow, and from which the salmon are taken by means of a net. In this way, as baulks to the passage of fish and detaining them where they may be caught, they are destructive, but as actual catching instruments they take few salmon, mostly shrimps and small sea fish. They work on the same principle as the putcher; the stream passes through them, the fish brought down by the stream get in and cannot get past them.

The other mode of taking fish in the estuary is that by which the largest number of salmon are caught, and is one that requires great skill, great knowledge of the ground and of the habits of the salmon. A man takes a large, long-handled V-shaped net, like an ordinary shrimp net; he enters the river where it is two miles or more broad, with a strong tide running most of the way across that distance to catch descending salmon. Any one who did not know how the net was used would say that what the fisherman proposed to do was an impossibility. Yet by this means the majority of the salmon taken in the Severn estuary are captured, and the capture is really sport, and sport of a very high class. Next to a rod and line there is no such sporting way of killing salmon.

The net is a fairly light one, about the size of a shrimp net, a V shape, about four to five feet across the top of the V, with a handle about three feet long, the mesh two inches from knot to knot. The fisherman wears no shoes or stockings, but has a short pair of drawers reaching not quite to his knees. When the tide has ebbed for about two hours there is some two feet or so of water running over some of the large sandbanks. On a fine clear day this expanse of water has hardly a ripple on it. For some reason descending salmon swim very shallow, and as the tide runs out they find themselves taken by the stream over the banks. As soon as the water begins to shoal, and the fish finds he has but little under him, he makes off rapidly for deeper water. His plunge shows in the shallow water, and this is the guide by which the fisherman acts.

The fishermen, as the tide is running out, wade on to the sandbank, and stand up to their knees in the water looking for the "loom," the strike of a fish. They stand there motionless with the nets over their shoulders. At last, some distance off, they see a fish strike as he is going over the sands. They know the size of the sandbank, the direction of the current, and so of the fish, and what they have to do is to try and cut him off before he can get into deep water. It is no easy matter to move quickly in water up to your knees, but the fishermen by a series of jumps get over the ground at a great pace. They have to watch carefully for the next "loom," to try to get below, that is, on the seaward side of the fish. If they can do this they generally get a shot at him as he passes by putting their net in front of him and then heaving it up; but this process is not easy with a large fish owing to the weight of the water. However, it has to be done, and if the fish is once fairly in the net he is very seldom missed. Where the failure takes place is if the fish is only partly in the net, then it is almost hopeless. If the fish is missed the fisherman is seldom able to get a second shot at him unless the fish strikes up stream.

Frôm this it will be seen that to be a good lave net fisherman, a man must know the limits of the sandbanks, or he may go with a plunge into the deep water over his head, and if he does his chance of coming out is not good; he must know the strength and set of the current, so as to be able to fix the place to get his shot at the fish, and not to let the fish get past him, he must be able to move rapidly through the water, and, most important of all, know how to get his net under the fish, or at least under his head half. It is a very fascinating sport, but it is one that requires great coolness, skill, and knowledge, and unless a person possesses these he had better not try lave net fishing. Should any one feel inclined to do so, Lydney, in Gloucestershire, is the head-quarters of this class of fishing.

PART II

TROUT

69 A WET-FLY STREAM

CHAPTER XIV

THE TROUT (SALMO TRUTTA)

CLASSIFICATION

By G. A. BOULENGER, F.R.S., V.P.Z.S., &c.

MOST modern ichthyologists agree in regarding the various European forms of trout, whether migratory or not, as varieties or races of a highly variable and plastic species, *Salmo trutta*, to be distinguished from the salmon by a few more or less constant characters, the most readily ascertainable of which resides in the smaller scales on the back of the caudal region of the body, there being 14 to 16 (rarely 13) in an oblique series between the posterior border of the adipose fin and the lateral line, and in the greater length of the folded anal fin as compared to the depth of the caudal peduncle. The gill-rakers are also usually fewer, 16 to 18 (10–12 + 6–7) on the anterior branchial arch. The young may be distinguished from salmon-parr by the greater length of the upper jaw, the maxillary bone extending beyond the vertical of the centre of the eye, and in specimens 6 inches long often to below the posterior border of the eye. The young are brown or olive above, silvery or golden below, with more or less numerous black and red spots in addition to the parr-marks (which vary from 8 to 17 in number), and, contrary to what is observed in the salmon, black spots are usually present below the lateral line. Except for the gradual disappearance of the parr-marks, this colouration is retained in the brook

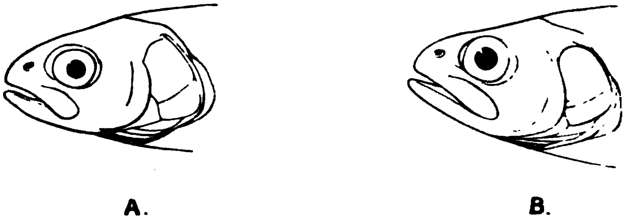


FIG. 4.—SIDE VIEWS OF HEAD OF YOUNG SALMON (A) AND TROUT (B). From specimens about 6 inches long.

trout or brown trout (*S. fario*), which is non-migratory, and varies much in size according to the waters it inhabits, in some brooks not growing to more than 8 inches, whilst in larger rivers and lakes it may attain a weight of 20 lbs. or more. The colouration of the young is more strongly departed from in the races known as sea trout (*S. trutta s. s.*) and sewin (*S. criox* or *cambricus*), anadromous forms resembling the salmon in habits, and assuming in the sea a silvery colouration with, however, as a rule, more black spots on the sides below the lateral line. For the distinction of such specimens from salmon, the most important characters are to be found in the number of scales between the adipose fin and the lateral line, as given above (see Fig. 3, p. 10), and the comparatively deeper caudal peduncle which can be realised by the method, suggested by a Scandinavian fisherman, of holding the fish round the muscular part of the tail: if it easily slips through the hand, it is a trout, but the constriction of the tail in the salmon permits a firmer grasp. The second character is not absolutely reliable, and counting the scales is a surer method in case of doubt.

The principal British races are the following:—

A. The northern sea trout, *S. trutta sensu stricto*, silvery, losing the teeth on the shaft of the vomer when adult, and migratory like the salmon.

B. The southern sea trout, sewin or truff, *S. eriox* or *S. cambricus*, similar to the preceding but with the hind margin of the gill-cover more or less produced, the lower bone (sub-operculum) projecting beyond the end of the upper (operculum).

C. The brown trout, *S. fario*, non-migratory, usually retaining the teeth on the shaft of the vomer, brown or olive with black and red spots; rarely more silvery, with black spots.

D. The Lochleven trout, *S. levenensis*, distinguished from the preceding by a more silvery colouration, frequent absence of red spots, and a pink or red flesh.

E. Estuary trout, *S. gillivensis* and *S. orcadensis*, large brown trout living in salt water without assuming the silvery colouration.

F. The Gillaroo trout, *S. stomachicus*, in which the membranes of the stomach are conspicuously thicker than in other trout, more so in adult examples than in young ones.

All these forms, it must be admitted, are ill-defined, and subject to such variations when transported from one locality to another as to render their recognition, even as races, a matter of insuperable difficulty. The instability of the characters on which *S. levenensis* is based has been conclusively shown by the experiments conducted by Sir James Maitland at Howietown.

Other European varieties are the trout of the Lake of Constance (*S. lacustris*), of the Lake of Geneva (*S. lemanus*), of the Lake of Garda (*S. carpio*), of Dalmatia (*S. dentex*), of Hungary (*S. microlepis*),

&c., all of which are regarded by the best modern authorities as mere local forms of *Salmo trutta*.

Male trout, when attaining a large size, develop a hook on the lower jaw similar to, but usually less developed than that of the salmon.

As stated above, the size of trout varies much according to the waters in which they live. The anadromous form, or sea trout, nearly equals the salmon in this respect, specimens of over 4 feet and weighing up to 50 lbs. being on record.

The habitat of *S. trutta* extends over the whole of Europe, the Atlas of Morocco and Algeria, Transcaucasia, Asia Minor, and Northern Persia.

THE NORTH AMERICAN TROUT.

The trout is represented in North America, west of the Rocky Mountains, by a number of forms closely related to their European congener, and distinguishable from it by a greater number of rays in the anal fin, 10 to 12 well developed, or 9 to 11 branched, and the caudal fin spotted with black. Of these the best known is the Rainbow trout, *Salmo irideus* or *shasta*, which, through the United States Fish Commission, has been introduced in many parts of Europe, as well as the Eastern States of North America and New Zealand. It is more hardy and accommodates itself in almost stagnant waters, and has thus proved a success in many ponds which were regarded as fit for coarse fish only. It is a handsome trout, bluish or purplish above, silvery or golden below, more or less profusely spotted with black, and with an orange or red lateral band. In specimens taken in the sea, for some varieties are migratory, the colouration is bright silvery and the black spots may be much reduced. It abounds in every clear brook in Western North America, from the Mexican line northward to Mount Shasta, and occasionally in coastwise streams to Alaska and Kamtchatka. It varies much in size, specimens from Northern California often reaching a weight of six pounds, while in the Rio San Luis Rey, the southernmost locality from which it has been obtained, it seldom exceeds a length of six inches.

The Rainbow trout merges into a larger form, *S. gairdneri*, of 12 to 20 lbs. in weight, found in the Columbia and other rivers, and having habits similar to those of our sea trout. Another close ally is the Red-throated trout or Cut-throat, *S. mykiss* or *purpuratus*, distinguished by a deep red blotch on the throat, between the branches of the lower jaw and the membrane connecting them. It has nearly the same range of distribution as the Rainbow trout, of which it is perhaps only a race.

In establishing "species," older authors were much influenced by the consideration of the various forms of trout being migratory or not. This view is gradually losing ground, and in a recent important report, Dr. Dahl, of the Trondhjem Biological Station, shows that sea trout are not dependent for reproduction on themselves only, but that a migration from fresh water to the sea goes on of trout which are not direct descendants of the sea form, but which belong to different varieties of fresh-water trout, and which, after they have reached the sea, become sea trout. It is well known that our brown trout in some rivers, when short of food, go down to the estuary, and perhaps to the sea, and the same has been observed with the Rainbow trout both in its native home and in our rivers.

Before passing on to the following section of the genus *Salmo*, it is desirable to allude, at least by name, to a very fine trout from Dalmatia, *Salmo obtusirostris*, specimens up to 30 lbs. in weight being caught in the Narenta River. This is a very distinct species, which in the form of the mouth, with its comparatively short and broad maxillary bone, is intermediate between trout and grayling. A closely allied form, named *S. ohridanus*, has recently been described from Macedonia.

THE PACIFIC SALMON, OR KING SALMON, *Salmo (Oncorhynchus) quinnat*, AND ITS ALLIES.

The group commonly designated as *Oncorhynchus* contains the largest and commercially the most important of the Salmonidæ. *Oncorhynchus* has been separated generically from *Salmo* as having a greater number of rays in the anal fin, viz. 13 to 18 well developed; but as we find 10 to 12 in *S. irideus* and its allies, and occasionally as few as 12 (11 branched) in *Oncorhynchus sanguinolentus*, the character is not one that would justify such a separation, and it is therefore better to regard the group of which *S. quinnat* is the type as a mere division of the genus *Salmo*. This course further commends itself by the fact that the Japanese *S. macrostoma*, with 12 or 13 well-developed anal rays, may be referred with equal propriety to either of these genera.

There are anadromous Salmonids inhabiting the North Pacific and entering the rivers of America as well as of Asia. They were first made known a century and a half ago by a celebrated naturalist, Steller, who applied to them Russian names which have been retained in the nomenclature by various authors.

The best known and most valuable is the Quinnat, Chinook, or King Salmon (*S. quinnat* or *tschawytscha*), found on both sides of the Pacific, from California and China north to Bering Straits, and ascending the large rivers in spring and summer. It has been introduced into the French rivers flowing into the Mediterranean and in Tasmania and New Zealand. It reaches an enormous size, specimens weighing over 100 lbs. being on record. In the sea, these splendid fish bite freely, but they do not take the hook when in fresh water. The economic value of the fish depends in great part on its being a "spring salmon," when the flesh has its rich orange-red colour; as the spawning season approaches (July to December), the silvery colour, similar to that of our British salmon, disappears, the flesh loses its salmon colour, the scales become embedded in the skin, the jaws of the males become prolonged and

70.—UNDER THE BUSHES.

71. NEARING THE END.

hooked, and the front teeth very long and canine-like, and these males become distorted in shape and more or less strongly humped at the shoulders. Dr. Jordan remarks: "It has been often stated and generally believed that the salmon receive many injuries by striking against rocks and in other ways while *en route* to their spawning grounds, and, as a result from these injuries, those which go long distances from the sea die after once spawning. An examination of many salmon at the time of arrival on their spawning beds in Central Idaho showed every fish to be entirely without mutilations of any kind and apparently in excellent condition. Mutilations, however, soon appeared, resulting from abrasions received on the spawning beds while pushing the gravel about or rubbing against it, and from fighting with each other. The spawning act extends over several days, the eggs being deposited upon beds of fine gravel in clear, cold mountain streams. Soon after they have done spawning, both males and females die, each individual spawning only once. This is true of all, whether spawning remote from salt water or only a few miles or yards from the sea. The cause of their dying is not conditioned upon distance from the sea, but is general in its application to all species of Pacific coast salmon." The fact of breeding only once has been observed to be true of all species of the section *Oncorhynchus*, and the same is believed to be the case in a Japanese Salmonid allied to the white-fish (*Coregonus*), viz., *Plecoglossus altivelis*, the life of each individual ceasing at the end of the season of reproduction.

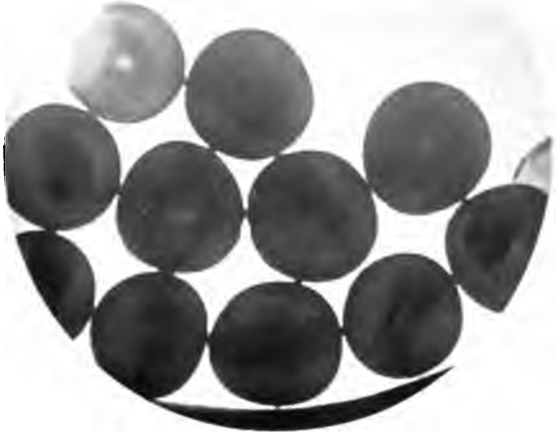
The numerous attempts that have been made to introduce the Quinnat salmon into the waters of the Eastern United States, of Europe, and of New Zealand, do not appear to have answered the expectations of pisciculturists.

CHAPTER XV

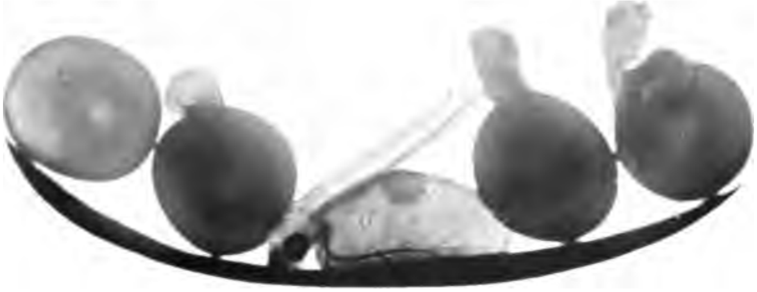
THE BREEDING OF TROUT

From Notes by Mr. E. V. Corrie, *of the Itchen River Trout-Breeding Establishment, Chilland, near Winchester*

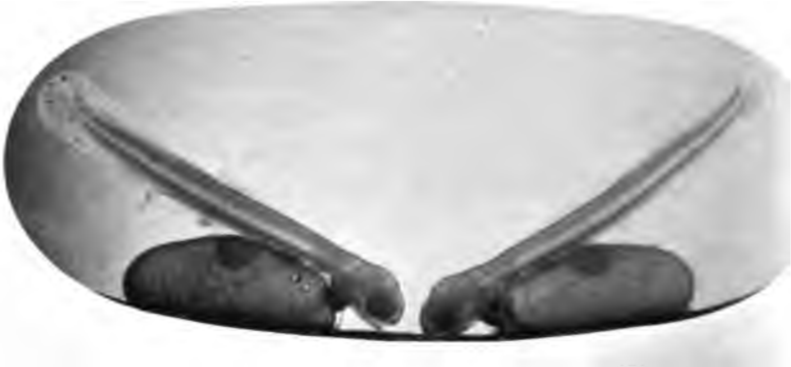
It is a wonder that more people who are idle do not amuse themselves with the hatching of trout. There scarcely is a country place of any size at all that does not possess a stream large enough for the purpose, and, provided only that it be large enough, the flow of water very easily can be regulated so as to make it suitable for a hatchery. Of course, the breeding of a few trout on a small scale for the sake of amusement is a wholly different affair from breeding them for sale. When this is the object, several conditions become important that are entirely outside the sphere of things necessary for the breeding on the smaller scale. In the first place, if the venture is to be made a financial success, it is important to consider the locality and the accessibility to a market. It is no good breeding the best and most prolific trout for sale unless you have reasonable facilities for delivering them to a prospective buyer. Proximity to a railway station is the first consideration, then, and the second, from this point of view, we may perhaps say to be that the locality should be fairly central, that is to say, not tucked away into a corner of England. Evidently the neighbourhood of the sea is not very desirable, for it cuts off from you a half, say, of the land area that might be inhabited by people willing to buy your trout. It perhaps goes almost without the saying that you must have, for your fishery, an unfailing water-supply, and it must, further, be such a regular supply as you are able to keep well under control. It must not be liable to come down in flood, which would carry all away—your artificial arrangements as well as the ova and the fry. The ideal grade, or fall, from the highest water to the lowest on the fishery is some ten feet. Good work has been done, and is done, at some hatcheries with a fall of no more than half this; but a five-foot grade only just gives enough for the bare needs of the hatchery and ponds. It is far better to have a margin. A certain fall is essential not only for the purpose of drainage, but also for the aeration of the water—an important



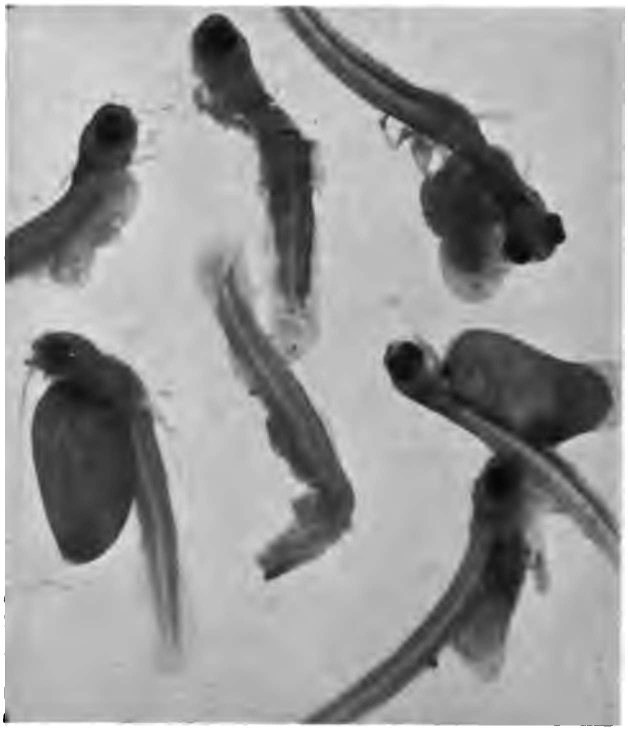
72.—*A FEW HOURS BEFORE HATCHING*



73.—*HATCHING.*



74.—ALEVINS THREE DAYS OLD.



75.—ALEVINS DESTROYED BY FUNGUS.

consideration. Nevertheless, though it is desirable that there should be this difference of level within the bounds of the fishery itself, it is not at all good that the land should fall away at all steeply just below the fishery. If this be the case, then, in soils of any but the most tenacious character, there will inevitably be a deal of leakage from the ponds, which will have to be met by constant trouble and expense in the way of puddling or cementing.

Spring water of about 48° Fahrenheit is the best for hatching purposes, and should be led to a level where, by gravitation, river water can be mixed with it in readiness for the hatching out of the ova. It is best that the sources of supply for the hatching water should be open—that is to say, should not be over-hung by timber. If the object of the fishery is to produce large numbers of trout in a small area, it is advisable to choose what is called a " lean, hungry, and cold " water-supply, for in such water the fry, the yearlings, and even the mature fish can be kept, without much fear of disease, far more closely crowded than is possible in a water with a larger food supply. The trout, however, that are reared in those conditions always will be stunted in their growth, no matter how liberally they be hand-fed, and after they have come to the age of eight months or so, are little value for stocking purposes, except it be for turning into rivers and brooks where the native trout run small. For the general purposes of breeding, a warmer and a "fatter" water is better. A water growing plenty of weeds and carrying an abundant supply of natural food is the best for three-months-old fry, yearlings, two-year-olds, and older fish. An ideal water-supply consists of spring water for incubation and hatching and then plenty of river water for all trout over three months old. The nature of water varies so much with its locality that no hard and fast rule can be laid down as to the volume necessary for raising a stated number of trout; but, speaking generally, a head of water given by a three-foot pressure on an escape measuring three feet horizontal by one foot vertical, will be sufficient to raise 25,000 yearlings and 8000 two-year-olds, besides stock-fish. Although it is not a good thing to have your hatching water-supply overgrown with timber, it is equally a mistake to pass the water directly from its supply to the place where the ova are kept. It always is better that it should run for some short distance in the open, and, if this cannot be managed by natural means, it is well to run it through a trough or distributing box, which has the further advantage of giving you a means of regulating the supply of water to the hatching boxes or troughs, so that each may get an even and equal flow. Let it be said here, at the outset, that where any woodwork comes in contact with the water, it should never be charred by fire or red-hot iron by way of preserving it from fungus, as many of the older treatises recommend. Such charring roughens the surface of the wood, and makes it full of cracks. The easier and better method of preventing the growth of fungus is to waterproof the wood with two or three coats of tar varnish.

The process of spawning the fish—that is to say, pressing the ova out of the spawners and the milt from the male fish—is one that requires the greatest gentleness, care, and delicacy in its manipulation. If possible, the novice should get the services of an expert to do this delicate operation for him, for it seems that it is practice and practice alone that gives the art of proper manipulation. It hardly is too much to say that force never should be used. Certainly this is a true remark as applied to the milters. Occasionally with the spawners, clotted ova or other troubles may produce some obstruction to free passage, and in that case, and in that case only, sufficient force must be employed to clear the vent. Any ordinary obstruction can readily be detected by touch, and a slowly advancing pressure usually will overcome the stoppage. It is to be presumed that no one will care to leave eggs to be hatched in natural course on the "redds," where an enormous proportion never come into contact with the fertilising milt at all.

When the fish show signs of spawning and are baggy they may be lifted out with a landing-net, and those that are ready for immediate spawning may be known by the loose feel of the ova within them, and in the case of the males by the readiness with which the milt is shed at the very lightest pressure. There are various ways of handling the fish for spawning them. That which seems generally found most convenient is to hold the fish by the tail with the left hand, using a piece of flannel to prevent its wriggling and slipping free; then, with the head and shoulders of the fish tucked between your left arm and body, you have the right hand free for the operation of spawning; that is to say, an equable and delicate pressure advancing from the pectoral fins towards the vent, until all the eggs or milt are spent. You will feel the ova moving in front of your fingers as these pass along from the pectoral fin, and care should be taken not to over-run the eggs, so as to compress them with your fingers. Your manipulation should always follow the course of the ova; never get in front of them.

You do not need to have any water in your spawning basin, which should be held ready at hand by an attendant. It is likely enough that at first you will let a fish or two struggle out of your hold as you are spawning it, and if it fall into the basin it may destroy a number of the eggs. It is probably on account of your unskilled manipulation that these disastrous struggles take place, and after a while you may hope to get so clever that these accidents will be very few and far between. The average size of the spawning basin is about 13 inches diameter by 6 inches deep, and a basin of this size is adequate to the holding of some twelve thousand or so of eggs. Fresh milt should be applied after the stripping of every third female. Wherever it is possible you should use wild fish as milters, but if you are compelled to use your tame hand-fed fish from stock, you should place them in shallow, fast-running water for some weeks before taking their milt from them. As soon as the fish have been stripped they should be set free again, and unless they have been improperly handled they are none the worse for the operation they have undergone.

All the effete milt should be washed away from the eggs as soon as they cease to adhere to each other; that is to say, within half-an-hour or less, according to the temperature of the water. There necessarily will be a small quantity of water that has dropped from the fish as you hold them over the basin, and as this will be insufficient to cover them you must add a little more. The washing is done by passing water through the ova till it runs out clear and free of milt. Statistics very fully establish the immense advantage of this "dry" method, as it is called, of fertilising the ova over the method formerly in use of putting them in water and then adding milt to the water. On the older plan 60 per cent. of fertile eggs was a fair average to obtain. On the modern plan some 98 per cent. is not too large an average to expect. Even after the water used in washing the eggs has run out clear, it is well to place the edge of the spawning basin under the run of a tap for thirty minutes or even longer, so as to keep the eggs on the dance all the while. Effete milt is a distinct danger, causing fouling of the hatching boxes, trays, &c. Of course it is not necessary for the beginner in trout culture to spawn out all his own eggs, and as a start he will probably do better to buy "fully-eyed ova"—*i.e.* eggs in which the eyes are apparent—from any well-recommended pisciculturist. Such eggs are likely to be larger than the eggs that can be taken from wild fish indiscriminately caught. What you want, to give you good and large fish, are good large eggs, and these you get from the larger and more mature females. A thousand eggs to every pound weight of the fish is looked on as a fair average for trout. In the case of salmon it is rather less, but in almost all other fish a good deal larger.

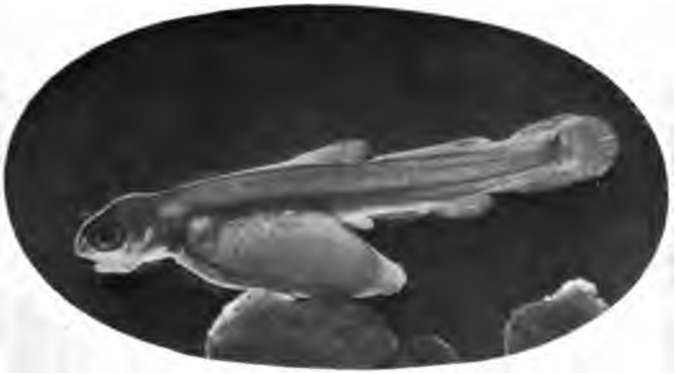
While the eggs are in process of hatching you should run as much spring water over and among them as you can without danger of washing them away or sweeping them out of place. The free use of a watering pot with a coarsely perforated rose is very advantageous, letting the water fall from such a height that the shower shall disturb the eggs slightly. If you have filtered river water to supply your hatchery, turn in some fresh water shrimps, but if you do this you should slightly reduce the run of the water, for the shrimps together with the stream may produce so much movement as to cause the eggs to drift together. A gentle movement, just short of this, is what you want to produce and maintain.

The hatching boxes in the hatching house must be so arranged that the eggs are not exposed to the sun, nor to too bright a light, nor are kept in too warm a temperature. The length of time that they will take in hatching, generally an average of fifty days or a little less, is determined a good deal by the temperature of the water, every degree of higher temperature making a difference, roughly, of five days. It is not, however, at all desirable that the hatching out should be hurried. Strong and healthy fish are far more likely to be produced from ova that have been long in the hatching, in a cool temperature and a darkened place, than from a hatching prematurely encouraged. If the water came from a river it must be filtered through two or more screens of flannel to catch all the sediment before it comes into the hatchery; the water that comes from a spring direct will not need so much care in this regard. The ova must not lie too crowded together, and no two ova should touch each other, unless all are to be moved every 24 hours. The boxes should be inspected daily for dead ova and other impurities, which can be best removed by an instrument like the filler of a fountain pen—that is to say, a tube of glass with a hollow ball of indiarubber at its head. By compressing the ball the air is expelled, then the other end of the glass tube is placed in contact with the dead egg or other impurity that it is wished to remove, and release of the pressure on the indiarubber ball causes the egg or whatever it may be to be sucked up into or against the mouth of the tube. A dead egg may be recognised easily by its milky or dead white colour.

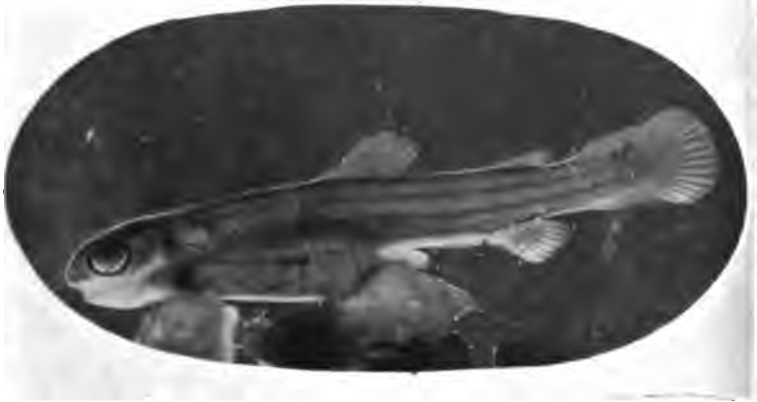
The average time of hatching in water of an average temperature of 48 degrees Fahrenheit is fifty-three days, and after about a third of this time has passed the black spots or eyes will begin to appear. It is at this stage that ova are most fit for transport in shallow trays with floors of muslin. Damp moss may be laid between the trays, and in cases of long shipment ice is added in order to delay the development of the ova. The actual process of hatching is very interesting to watch, as the tiny fish bursts the shell of its egg and comes out with the yolk sac attached to it, in what is called the "alevin" stage of its development.

When eyed ova are bought for the purpose of stocking a fishery, they may be laid down, just before hatching, either in a specially prepared part of a natural stream on a gravelly bottom, over which the rush of water can be regulated by a dam and sluice, or may be laid on wooden beds. They must be carefully shaded from the sun, and should be protected by zinc enclosures from the attacks of fish, water rats, birds, and all their many enemies. During the "alevin" stage the immature fish feed entirely on the contents of the yolk sacs, but as soon as these are absorbed they must be released from their cages in order to seek their living in the wide world—that is to say, in the open waters of the stream or river.

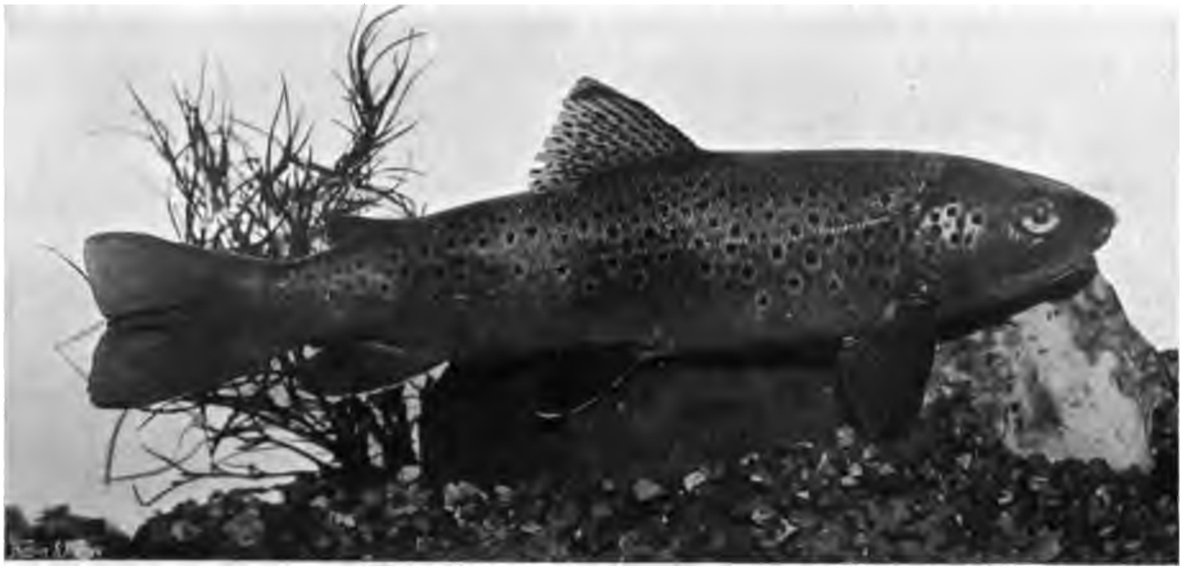
In some respects the alevin would make an ideal soldier. Feeding on the tiny yolk sac that is attached to him, he is perfectly self-supporting. He needs



76.—*ALEVIN TWO WEEKS OLD.*



77.—*ALEVIN FIVE WEEKS OLD.*



78.—ADULT FISH.

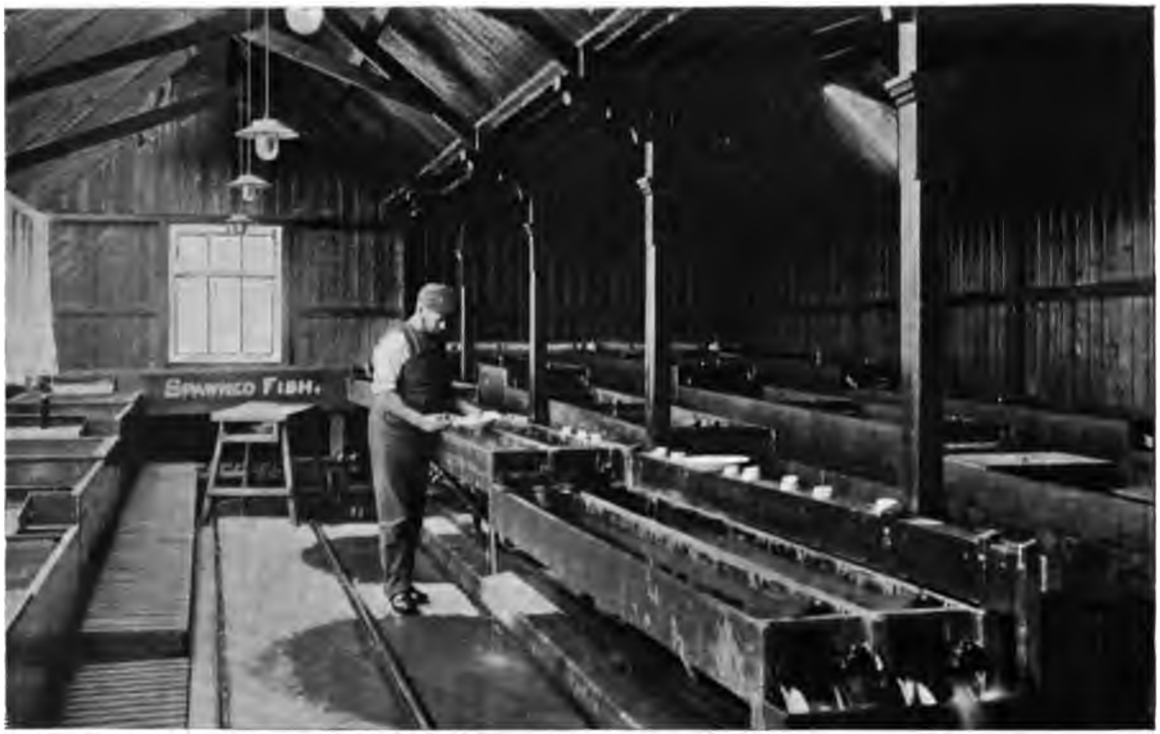
neither a commissariat train nor foraging parties; and so it goes with him for some five weeks, by which time the yolk sac will be almost entirely absorbed, and he begins to feed like a full-grown fish. As the alevins hatch out, a mass of egg shell will be left, which is best baled out with a cup, and as soon as all are hatched their numbers should be thinned, leaving only a thousand or so in a space 12 inches by 6 inches. You will notice if you lift the cover of the boxes you will find that they make every effort to take cover from the light, and it is clear that their growth goes on better in the dark. As they lie at the bottom of the box you will find that they keep their fins in constant motion, thus continually aiding in the aeration of the water. If their numbers are thinned as described, they may be allowed to remain in the hatching boxes until nearly on the feed, when their further thinning will vary accordingly as you turn them into rearing boxes or fry ponds. When the alevins are ready to feed for themselves you may see them leaving the sides of the boxes where they will have lain massed together, coming boldly to the top of the water and making dashes at any tiny foreign body floating past them. It is impossible to say which of these two methods of incubation and hatching is the better for general uses, for Mr. Corrie writes as follows:—"At one of my fisheries I got first-rate results from ordinary hatching sets (80,000 eggs to each set) fitted with perforated zinc trays; at another all the ova are incubated and hatched on gravel with equally good results. In the first instance the hatchery consists of a building fitted with best modern appliances, very similar to those used at most piscicultural establishments; in the latter the gravel-lined hatching troughs are merely sheltered in a space cut out of rising ground protected overhead by plank covers reaching from one side of the 'dug-out' to the other, the covers being but three feet above floor level. A temperature of 28 degrees of frost has failed to harm the 'dug-out' hatchery, which was made at very small cost, and has been in use for many years. When incubating large numbers of eggs for supplying the market, a well-built hatchery house fitted with packing rooms, &c., &c., is needed, but when only a few hundred thousand eggs are hatched, and the alevins shifted straight from hatching troughs to rearing ponds, a 'dug-out' covers all requirements for practical purposes."

This is a point very well worth noting, for no doubt many of the expensive apparatus are really not of practical value; but in any case the rules of cleanliness should be strictly attended to. Of course, in a "dug-out" it is difficult to pay the same scrupulous care to picking out all dead eggs, &c., which is rather applicable to the case where a few eggs, comparatively speaking, are being hatched. In the "dug-out" more wholesale methods must prevail.

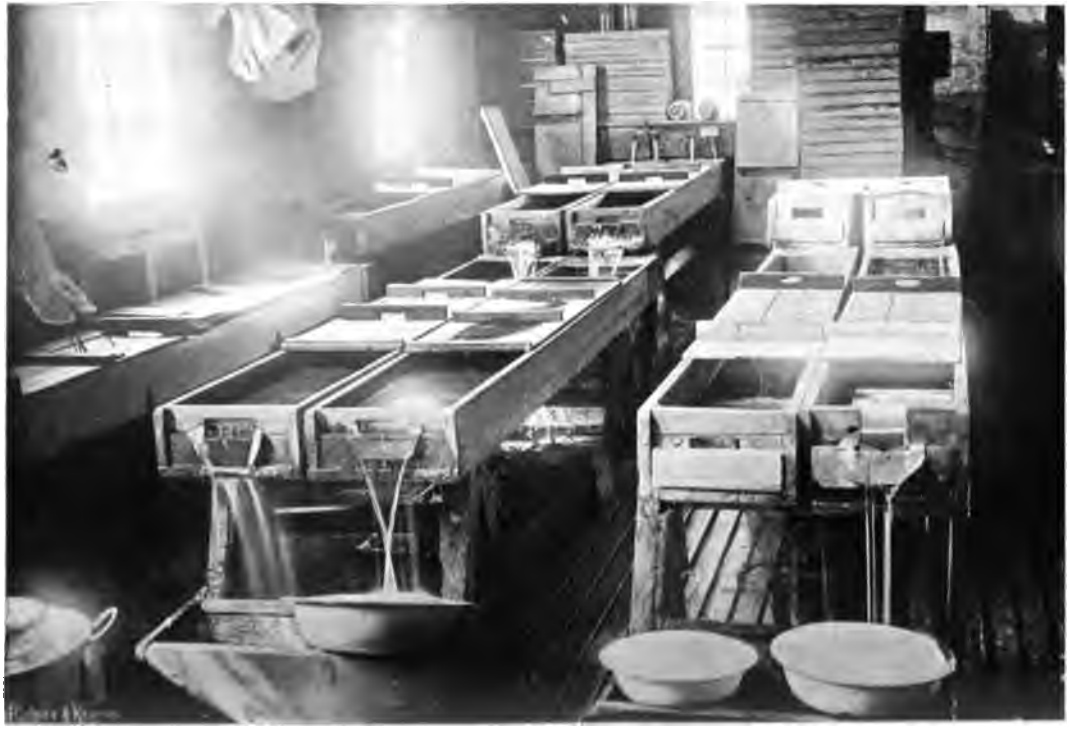
Just before the alevins have absorbed all their umbilical sacs it is well to transfer them into rearing ponds out of the dug-outs or hatching boxes. Here they must have a constant supply of brook or spring water passing over them, at just such a force as they can stand without being washed against the lower barriers of the ponds. The ponds, which should be shallow and gravelled on the bottom, should succeed each other in a series down stream, so that the chain of fry ponds is really better described as a long ditch with barriers at every five yards, say. The barriers and the fall should be so arranged that there shall be a drop of three inches, say, from the top of the barrier to the surface of the water below it. When first the fry are turned into these ponds they should be very sparingly fed; and perhaps a great deal of the heavy percentage of loss that some fish culturists have suffered at this stage is to be ascribed to over-feeding. It is especially necessary that the food should be given in very minute morsels, otherwise the fry are very apt to kill themselves in an ambitious effort to get outside a mouthful that is altogether too big for them. Although the fish are to be fed so sparingly, they must be given a very fairly constant supply, and this can be best provided by use of the "Corrie" automatic feeder. Be it said, in the first place, that the chief food of the fry is to be fish meal. As the fish grow bigger, and especially at certain seasons, as after spawning, and so on, a more generous flesh diet, of liver and so on, may be given, but in the stage of fry a simple and pure fish meal diet is the best for them.

The "Corrie" feeder consists of an ordinary hatching tray in basket of perforated zinc with a thick wooden lid. There must be sufficient wood to keep the tray floating when it is filled with fish meal. Into this tray, together with the fine fish meal, which is able to escape only in minute portions through the perforations of the zinc, you should put a couple of active crayfish, or, failing them, two or three "miller's thumbs" or minnows. The object of thus imprisoning these people is that their movements shall keep the morsels of the meal in a perpetual agitation so that they shall escape from time to time through the perforations, and so supply the fry in the pond. You will find that two healthy crayfish or four "miller's thumbs" will pass through one of these feeders fully half a pound of meal every eight hours. The feeders will require to be moored by a string at the intake of the pond.

The diseases to which baby trout are subject are about as many as the human baby, and they seem a deal more deadly. There is a disease of the gills which is especially liable to attack the fry, and is the more insidious because it may be existent among your nurslings for some while before you find it out. But though it hardly ever seems to be the case that a diseased one of your fry recovers, there is this to be said, by compensation, that though the diseases are so hard to cure they are very much easier to prevent—chiefly by the means of cleanliness and an unfailing supply of fresh water. To ensure this latter condition it is essential to have



79.—*A SPAWNING HOUSE.*



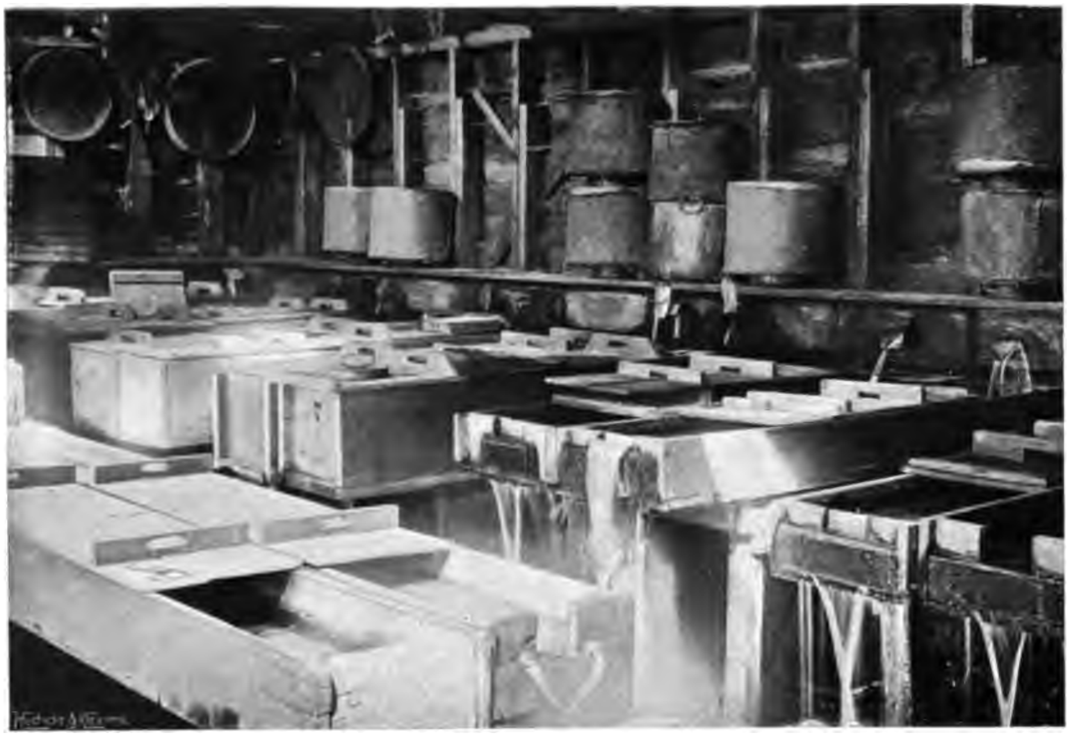
80. HATCHING BOXES.

your succession of ponds arranged so that if it is necessary to drain off the water from any one of them it shall not interfere with the supply to the others. The ways in which this can be managed are so various, and have to be so varied according to the different lie of different ground, that it is not necessary to go into details. The principle has to be recognised, and the ways of best carrying it into effect cannot fail to suggest themselves. As the fish increase in size the largest and most vigorous should be sorted out and placed in rather deeper pools or ditches, and when they arrive at or near the yearling stage they may be put into ponds of four feet or so in depth; but all ponds should be drainable, and the caution given just above in regard to their management must be attended to.

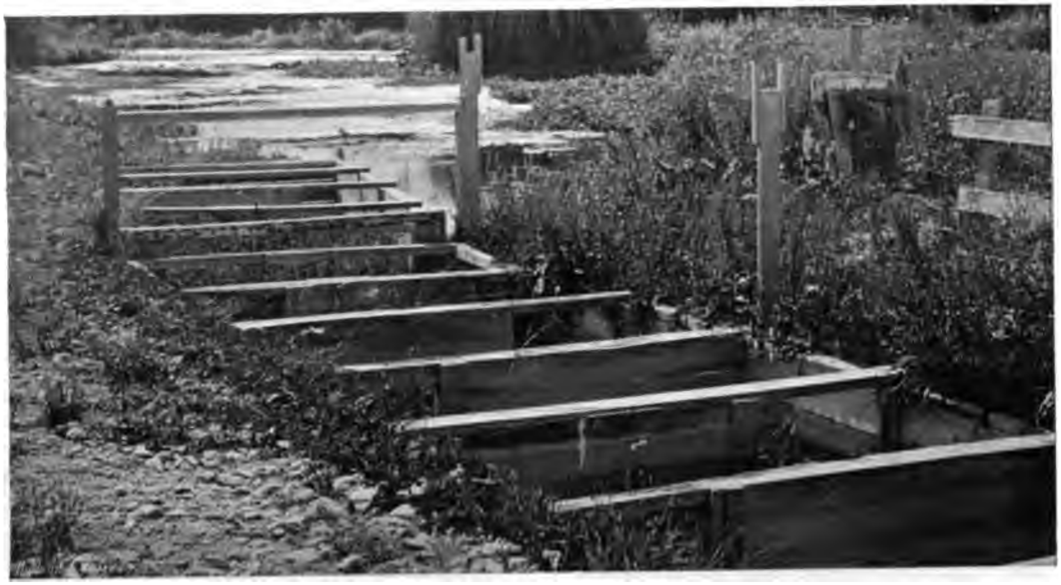
For screening, that is to say for caging and fencing off, the fry the ordinary vertical screen of perforated zinc does well, protected by one or more false screens. Horizontal screens, with overflows and by-washes, can be arranged, but a written description of them would be very complicated, and they are better learned by seeing them. Up to the yearling stage, the perforated zinc gives the best kind of screen, but thence onward galvanised lattice is more suitable. The "Locket" lattice is the best for resisting heavy pressure and wear, but the ordinary "tied" lattice will hold up in four or five feet of water, with moderate pressure, if well supported.

Fish meal, as we have said, is to be the principal food of fish at all stages of their growth, and more particularly when they are in the "fry" stage. As they grow older you may give them a rather stronger diet, of liver (raw) and boiled horseflesh, but this should only be used as a variation of their staple food, which still should consist of the fish meal. When the fish arrive at the two-year-old stage the diet is still the same, but they will do with the meal not nearly so finely divided up. Give your more mature fish flesh, boiled and raw, immediately after the spawning season, for this generous food enables them to repair quickly the natural waste. At other seasons give them fish-meal occasionally, mixed with a little boiled horse-flesh.

If you are forming trout ponds out of a natural stream running through your grounds, the question at once arises whether this is better done by damming up the main stream at convenient places, or by making a chain of ponds at the side of the stream and leading into the chain a volume of water which will be fairly constant. The latter probably is the generally better plan, on account of the greater control that it gives you over the water supply to your ponds; but "circumstances alter cases," and it may happen that such a chain of ponds at one side of the stream is impracticable. It depends on the lie of the ground. In any case, it is a good plan to have an overflow channel above the pond or ponds, by which the extra water, laden with the mud and vegetation that a spate brings down with it, may be led away. You have to see not only that the quantity of water is fairly con-



81 —TRANSPORTING TINS.



82.—SPAWNING RACE.

stant, but also that its temperature does not rise too high in summer (this, of course, can be controlled by the supply of fresh water running through it). It is essential that the ponds should have some shade, and at the same time overhanging trees are a nuisance in the autumn when their dropping leaves cannot fail to close up in some measure your water gates and screens. It is very important that your screens should be fish-tight, *i.e.* should not allow any small fish to pass out into the wide world of the natural stream, where they will almost certainly be lost to you, nor into the companionship of bigger fish, by whom, no less certainly, they will be eaten up. Another way by which the fish may get shade is from the aquatic plants. Before you commence putting trout into a pond it is well to know, in the first place, whether the vegetation already existent therein is of the right kind, and to this end, if you have not an expert knowledge of water botany yourself, it is as well to submit samples of your weed to some one that has. You may send the samples, if you please, to the nearest pisciculturist, who will be ready to assist you by telling you what you have that is of any value and how it best may be supplemented. You do not want any of the dock weed that chokes up a pond, but you want weed that will give the trout shade and shelter and will be good food for water-snails, shrimps, and various larvæ on which the trout can feed. Water celery is good; so is the lake-wort and the water star-wort and water-cress. Before turning in your trout it is well to start a growth of these useful plants, and also to introduce a supply of fresh-water shrimps and snails, with larvæ of the mayfly and any other kinds that are likely to flourish. All these—vegetable and animal alike—you can get, in all probability, from the pisciculturist who is nearest to you. There is an idea that the pink flesh of some trout is due to the presence of fresh-water shrimps for their diet, but I find in one and the same pond some fish with pink flesh and others, seemingly in as good condition and of the same size, whose flesh is very pale. Perhaps the former is a shrimp lover and the latter not, but it would be hard to prove the difference of their tastes. Neither do I find (although this, I know, is contrary to the most generally received opinion) that the pink flesh is more delicate eating than the paler. Which heretical opinions being stated, let us turn to other points of controversy.

The best kind of trout for turning down in our British waters, generally speaking, is, without doubt, the common native brown trout. Especially is this the case in streams and rivers. In small quick streams a useful cross is that between the English river trout—say from the Test or Itchen—and the little active trout of the Highland burns. Very likely trout from the small Devonshire moor streams would cross equally well, taking the Highlanders' place. Loch Levens are not suitable for rivers, for, whether in river or lake, they are apt to become bottom feeders after a few years, not rising to the fly. However, the rule is not without its exceptions, and there are ponds, and in some cases quite small ones, where the Loch Levens continue to rise well to fly up to a great weight. Big trout, however, of every species, with the possible exception of the rainbow, are apt to become cannibals, with the doubly evil result of eating their own fry and declining the artificial fly. In streams you commonly will find the older Loch Levens in the deep pools and never coming near the surface for food. Neither are the cross-bred Loch Levens and fario anything like as good for the angler's purposes as the pure-bred fario.

Where fario—that is to say, the common trout—will flourish, there they are almost always best. The only exception, and then only in exceptional circumstances, is the rainbow. It is not the least use introducing rainbows into rivers unless the portion of the stream in which they are placed is carefully screened off. Otherwise they will stay for a certain time in the river provided it be of sufficient depth; but after a while they disappear utterly, and it seems as if they might be developing the tastes of the sea trout, himself, probably, in his origin a fresh-water river fish. It is the more remarkable that they should show this tendency, because they seem to be contented residents of the larger rivers of America. Perhaps their voracity, which is great, and forms part of their excellence as a game fish, is the cause of their wanderings in our relatively small streams. Nevertheless there are lakes and ponds in which the common trout will not thrive, but where rainbow resist the evil influences of stagnant water and high temperature that the fario will not suffer. What happens with the rainbow when turned into running water is commonly this: If put in just before their breeding season they do not show any immediate inclination to be off down stream, although they will shift about a good deal in search of suitable redds, where they spawn freely. After spawning, however, the spent female quickly drops down stream, travelling long distances in a single night. The male fish hang about the redds for a while, eight weeks or more, after the females have left them, but then they, too, begin to travel seawards. The barren fish alone remain in the river, but even they are commonly in a very unsettled state, working miles of water up and down. The best chance for the rainbow to make a successful river dweller in this country is in the Thames, where the foul water of the lower reaches possibly may deter them from the sea trips to which they are so partial. Yearlings, which have been reared in confinement and turned in seem to disappear from most unfenced rivers immediately. Fry will stay where they are turned in until they are from four to five inches in length. The two-year-olds perhaps show the least inclination and hurry to be off, but with all of them it is merely a question of time. Securely fenced in, however, rainbows are the most sport-giving fish in our waters, breeding fairly well in suitable places, and thriving where ordinary brown trout would die. They continue to rise freely and greedily to the artificial fly, even after attaining a size at which most trout would almost certainly become bottom feeders and for the most part cannibals. Cannibalism is a vice from which the rainbow cannot be said to be free—indeed they are cannibalistic even from the earliest beginning of life as fry; but they are less addicted to it than any other kind of trout. The delicate stage of the rainbow's life seems to be the alevin, when they cannot stand too close confinement and crowding; but after they attain the length of three inches or so they may be herded together in large numbers without fear of loss. Their spawning time, it is to be remembered, differs from that of the trout of this country in being the spring instead of autumn. They thus come into condition a good deal later in the summer.

There are some differences to be made in the treatment of the rainbow as compared with the common brown trout, arising from that immense voracity which gives them some of their best qualities as game-fish. In sending trout by rail it is necessary to starve them for a day or two before starting in order that they may have no undigested food remains in their stomachs. If this be not attended to the percentage of loss is certain to be very heavy. But whereas it is neceesary to starve common trout for, say, five days, you will have reduced the rainbow to a like suitable state for transport by starvation for two or three days only.

In both cases alike it is well to use plenty of carriers rather than to crowd the fish together in iced water. It is most important that the fish should be met immediately on arrival of the train, and be conveyed as quickly as possible to the water which is to be their home. If this is not attended to, and the fish are allowed to remain in the water that is not aerated by any movement or shaking, a comparatively short period of this stagnation will kill every one of them. On arrival at the water into which it is proposed to turn them, it is well, first, to empty out half the water from the carrier and to fill up from the water of the brook, pond, or stream. In this way the change of temperature in the pond or stream from the water in the carrier is modified and made more gradual than if the fish were turned directly and at once from the latter to the former. Turn them in gently and carefully, not pouring them from a height, but quietly. In the case of fry it is best to turn them into a stream running into the pond they are intended to stock rather than into the pond itself. When stocking lakes and ponds with rainbow it must be remembered that they need large food supplies, and unless they are hand fed only a small number, compared with fario, must be turned in. The number may vary a good deal, no doubt, with the richness of the food supply in the pond; but a good general maxim is that two hundred and fifty rainbow yearlings to the acre are an ample stock to allow full growth of the fish turned in. Yearling rainbows that have been sent by rail or waggon in iced water are very apt to die—the average loss is something like thirty-five per cent.—some twelve or twenty-four hours after the journey; and this in spite of the most careful and skilful treatment at the hands of the consignee. Fry and two-year-olds, on the contrary, are very hardy travellers. In the case of the latter it does them no harm to have the temperature of the water in their travelling tanks lowered by the application of ice to the *outside* (*N.B.*, not the inside) of their travelling tanks, but the cost of the ice would really be better expended in the carriage of extra water. Two experimental stockings of unfenced waters especially prepared for rainbow, giving them all that their heart seems to desire, were made in the immediate neighbourhood of the Itchen River Trout-Breeding Establishment at Chilland, with the result that all the yearlings disappeared into the adjoining river, where a few, but very few, occasionally were seen on their journey seawards. Another experiment to test the hardiness of rainbow trout was tried at the same fishery. Four hundred and fifty two-year-olds were placed in a ditch fifty yards long by five feet wide, and carrying a slow run of water only two feet deep. The fish were hand-fed daily, with the result that they did remarkably well, and soon averaged over a pound in weight. For a very large and deep stretch of water, that it practically is impossible to overstock, and where the fish cannot escape, rainbow probably are the best trout of all by reason of their eager rising to fly, fine fighting qualities, and the excellence of their flesh on table. Also, in some nearly stagnant waters they will do well, as has been indicated, where the brown trout would die; but for all general uses the common fario of our islands is the best fish. The cross between the south-country fario and the small burn trout does not seem to stunt their growth at all, but gives them a healthy liking for the swift and shallow places of a stream, where they often will keep to their feeding grounds better than the pure-bred south-country trout. Loch Levens are not to be recommended for the reasons previously given, neither is Fontinalis a useful variety, being rather short-lived in this country, needing to be fenced in, and very often requiring hand-feeding also.

The easiest and cheapest method of stocking with any breed of trout is, without question, to lay down fully eyed eggs on artificial redds. The redds are quickly and inexpensively made, easy to keep in good working order, and in three years will fully stock any trout stream, provided the coarse fish are kept within reasonable limits. The redds should tail off into protected runs out of which the fry can escape at will into the water that they are meant to stock. During the first two seasons, before the ova on the redds have developed into fish big enough for sport, mature trout can of course be turned down to amuse the impatient angler in the meantime. Expert advice, however, is absolutely necessary in the construction of the redds.

"It has taken me," Mr. Corrie writes, "seven years of thought and experiment before arriving at a really simple and effective method of redd-making. In the future," he continues, "I feel assured that the professional fish culturist's work will be limited to supplying eyed ova, and that the yearling, two-year-old, and three-year-old market will not exist."

It is far better, where it can be managed, that the trout should be hatched in the water in which they have to live; but where this is impossible, and fish have to be purchased from a distance, by far the best results for the money spent are obtained from the purchase of fry. Next best to fry are yearlings; and two-year-olds only should be bought when time is an object and money is not. But fry are an "easy first." For transport to a distance the right age of fry is that at which they barely have absorbed the umbilical sac of the alevin stage. Fry "well on the feed" are of little value for turning loose into streams. Liberate them gently, as has been recommended, at the head of clean, sharp-running streams, where they will at once, if young enough, seek shelter among the stones.

It never is safe to send fish by rail when the weather is warm, and as a rule this should not be attempted until the latter end of September. If ova have to be sent long distances, as in shipment across the sea, they may be packed in live moss, with ice near it, to lower the temperature and so retard the development of the ova. For the purposes of ordinary travel of the few hours' duration that is requisite in this country, it is enough to pack the ova in low trays made of calico stretched on wooden frames, a layer of eggs placed on each calico tray, and the trays laid one on another in a box. If necessary they may be sent thus on a journey of several days' duration; but this test hardly is required of them in going from one part to another of Great Britain.

If you are making a fresh start with your trout ponds, forming them according to the foregoing suggestion in a chain beside your stream, or even by damming up the direct course of an existing stream, then you have at least the advantage, to compensate for all this labour, that you have a clean sheet—that is to say, an empty pond—to work upon. Nothing, practically speaking, is in it until you begin putting something in. The blessedness of this condition hardly becomes apparent until you have tried the experiment of introducing fish into a pond already inhabited. By reason of the inveterate cannibalism of fish, it is a constant fighting against superior forces to get trout to do in a pond that already has in it any of those worst of cannibals, pike, or, only in one degree less villainous, perch. To be sure the perch do not grow so big and are not so wholly cannibal, but they will take a heavy toll of trout up to the yearling stage nevertheless. There is this advantage to put against several disadvantages, in the introduction of trout of mature age, that two-year-olds, say, have a far better chance against pike (they practically would go unscathed by perch) than younger trout. Pike and perch are the worst foes, but they are not the only ones. If you look forward to your fish spawning on any artificial or natural redds communicating with your ponds, you should remember to protect these carefully with screens against eels and other things—including the trout themselves, that are fond of ova; and even the most harmless of vegetable feeding fish, if they do not eat either the spawn or the shrimps and larvæ which you destine for your trouts' nutriment, at least do this evil—they eat the vegetable stuff that ought to be the sustenance of the food supply of your trout. So that, while some coarse fish in a pond are infinitely worse than others, all coarse fish are bad. You want to be rid of the lot of them, from the eel to the pike.

To get rid of them thus wholesale perhaps is hardly possible, but there are some drastic methods by which you may effect a very satisfactory clearance if the pond is not too small. There is draining and there is dynamite. It is not always feasible to drain a pond. It is not always feasible to dynamite it so that every living fish within it comes under the influence of the concussion, and, after all, there is something revolting to the feelings of a properly constituted lover of the angle in the idea of employing this weapon of the anarchists against even the coarsest of fish. There is a cold-blooded and wholesale murder about it that is not nice. If you can drain your pond, well and good. You can net out the fish as the water falls lower and lower, and send them off to stock waters where trout will not thrive and where coarse fish will be appreciated, or you may find many of your poorer neighbours who will not despise a dish of perch or pike even if you are foolish enough (never, probably, having tasted them) to do so. But then, even when you have netted out all the live fish, you are far from having destroyed all the potential fish life in that area. The channels into the pond, the mud of the pond itself and all connecting with it, will be full of the ova of some or other of the kinds of fish that you have managed to net out pretty thoroughly. If you run the water back into your pond, in a short while you will find it teeming again with fishy life not less numerous, although the individuals will be smaller and less mature, than before you commenced operations against them. Of course it is a great point that the fish now will be fry, and that any trout fry you may put among them will have more than a fair chance with them, for the trout is game enough when he is not hopelessly overmatched. It is possible, however, to make even a more complete job of it than this. If you leave the area of the pond waterless for a while, then the ova will perish, but it is wonderful how hard it is to keep the creeks and channels absolutely so free of moisture that the eggs are deprived of life, and especially is this the case with the eggs of the worst shark in your fresh water—the pike. He has a way of making his nurseries up the sheltered places overhung with vegetation, up which the water runs in driblets to the pond, that are very difficult to get at, and very hard to dry out thoroughly or to treat with lime or any of those cleansing and life destroying agents that you can scatter liberally on the main

83.—FEEDING THREE-YEAR-OLDS.

floor of your pond. Every pond, even without the inducement of getting rid of your coarse fish, is the better for a draining off, a turning up and cleaning of the soil after every few years. Even the ponds that are inhabited by the trout only are much the better of this treatment, which gets rid of the stagnant mud and vegetable deposit that interfere with the best health and vigour of the fish.

After all, you can but do your best. If it is possible to drain out your ponds and let them lie fallow and dry for such length of time as shall suffice to kill off all the life of the buried ova, so much the better. But if you cannot do this, if you cannot apply lime to the drained surface, or if you cannot drain off the pond at all, then you must make the best of the circumstances such as they are, and try less wholesale methods of getting rid of the undesirable coarse fish. The most obvious way of doing this is by netting, and it is apparent that the more often you net the more thoroughly will you be able to get out of the pond all its denizens that seem unwelcome there. Until you have introduced the trout into your pond it does not matter much when you net; but after it is peopled with trout it is best to avoid netting it during the spawning season of the trout. You may best net for pike during August, September, October, and November. It is, of course, advisable to remove the weeds as much as possible before netting operations begin, but where it is not possible to get completely rid of the weeds, or where the bottom of the pond is uneven, then it is a very good plan to drag a chain across the bottom of the pond, before netting, in order to scare the pike out of their hiding places. When they have thus been alarmed they will not come much to the surface, so that they are not likely to escape over the top of a net, but will keep deep down. A very large pond or lake it is, of course, impossible to net thoroughly; that is, unless you have been able to let off a good deal of water, which is virtually making it into a small pond. If your net will stretch nearly across you may guard the outlets at either side by splashing from a boat to frighten back any fish that might try to escape, and you may do something by frightening the fish up into a corner or neck, where your net will reach from side to side. The net that practically is the only useful kind is the drag-net, virtually a wall of netting of the depth of your water, and stretching from side to side of it. This wall is moved along by men holding the ends on either side, and so all the fish are herded along in front of it, or are caught in it as they try to escape back. A "pocket" net used in this manner is the most effective of all—that is to say, a net of two walls, whereof the wall nearer the fish is of rather small mesh and the further net of large open mesh. When one of the fish, tired of being forced forward by the advancing net, tries to dash back through it, the impetus carries a portion of the small meshed net, which hangs less tightly stretched than the other, through one of the large meshes, and there the fish is caught as in a pocket. Where it is a question of netting a stream, a stop-net also must be used as a barrier to prevent the fish from going indefinitely far down stream before the advancing drag-net. If there are weeds in the stream, or the floor is uneven, it is well to run the chain along as described some twenty feet or so in front of the drag-net. It is nearly certain that in so doing weeds will be torn up and will come floating down on the surface, and in this case it is well to lower the stop-net from time to time to allow of their passing over it. The frightened pike, as said before, will be deep in the water, so that there is little fear of any of them escaping over the top of the stop-net when it is lowered to let the weed go over.

Pike are good sporting fish, but it is not our present business to deal with them from that point of view. From the point of view of the trout-breeder they are fresh-water sharks, wolves, vermin—whatever name you please that is most abusive—to be killed down by every possible means so that the cherished trout may have leave to live. An amusing though may be somewhat a poaching way of killing them, is by wiring. On warm days pike are fond of lying in fairly shallow water, where you often may see them distinctly from the bank. A pole and a wire noose at the end, with a slip knot on the noose, are all the apparatus required for this fish snaring. You see your pike lying there, you lower down your slip wire and pole very quietly until you have the noose over the pike and about his middle, then a sharp pull tightens the wire upon him so that he cannot escape and you have him. The question of fishes' sleep seems to be raised by this mode of catching. In what sense they can be said to sleep is much debated, but it is fairly certain that they, like other animals, must have some period of quiescence, for the repair of waste, that virtually is sleep, and it is hard to believe that a fully wide-awake pike would allow itself to be snared so very simply as the business is here described. Yet so it is, sleeping or waking, the wiring is an effective mode of dealing with the pike in detail. If your water is wide, and the pike lie far out from the banks, a useful plan is to stretch a cord, with a white flag fastened about the middle of it, from one bank to the other. Then if the cord and flag be danced up and down the pike are frightened away from the middle of the water, and come nearer the side within sight and reach.

85.—"*HERE AND THERE A LUSTY TROUT.*"

86. *A HAMPSHIRE STREAM.*

CHAPTER XVI

HOW TO MAKE A TROUT STREAM

By E. Valentine Corrie

The chief features of our well-known rivers vary so much that, in place of describing how best to deal with any of these streams in particular, I propose to picture imaginary rivers, endowing them with such difficulties as are to-day almost the despair of anglers, who, could they only see some simple and effectual method of procedure, would more willingly spend time and money on the stocking of their fisheries. How to stock a stream with trout is one thing, but how to keep it stocked without continued and heavy expenditure, is the real question side. I had to leave the fishery that same day, but on the following morning my friend caught nice fish where, previous to the erection of the shelter, the bare shallow had not seemed to hold a single fin.

In the upper part of the Waterfall River, where the loose shaly bed is periodically scoured by flood water, the result of weed planting may be brought to little by sudden spates during unfavourable seasons, but weeds are quick-growing things, easy and cheap of acquirement, and if planted after spring floods soon take root and are well worth the little cost and trouble involved.

On the lower reaches of the Waterfall River, where the run of the stream is slower, the heavier water holds several kinds of weed; also pike. These weeds should, previous if possible to frost, be cut as closely as possible, the pike netted out, trimmered, wired, shot, and, in fact, during every month in the year, be hunted by all known methods suitable to varying conditions of the water.

For re-stocking the Waterfall River, and indeed most English streams, the quickest and most expensive way is to purchase and turn down large numbers of yearling and two-year-old trout; but few of us can afford the heavy outlay or the possible loss caused by the new-comers wandering beyond our fishery boundaries, and, even at the expense of time, most of us would prefer an equally sure and much less costly way of stocking. This desired result is surely obtained by laying down fully-eyed ova in properly constructed artificial redds.

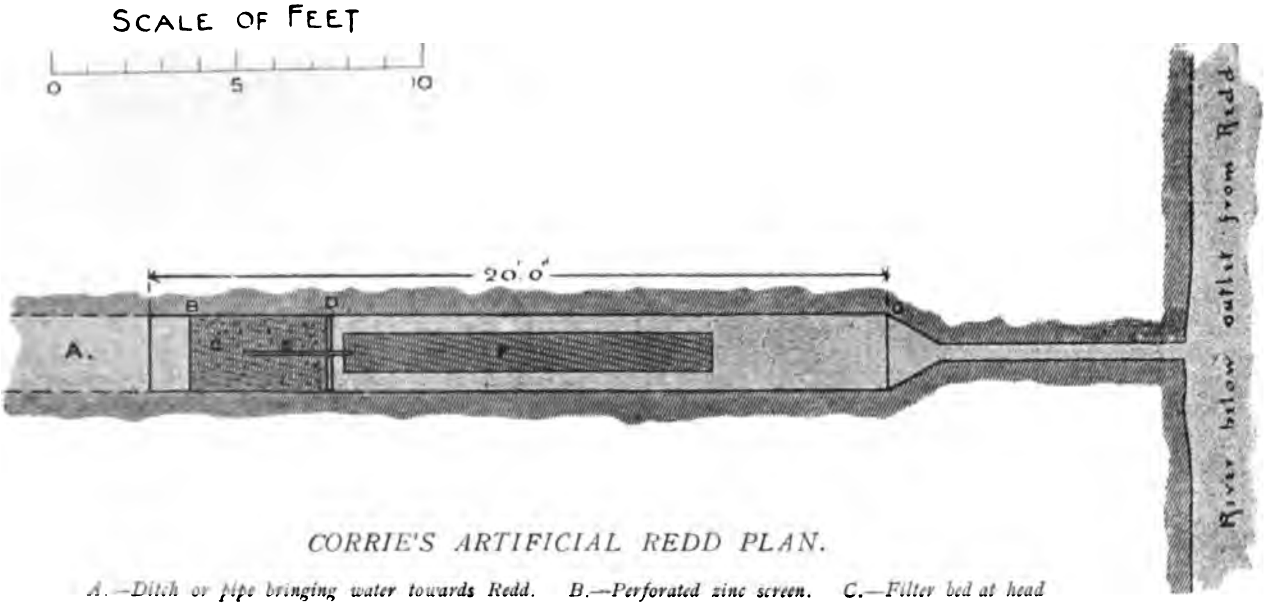
On the upper tributaries and some parts of the Waterfall River small springs exist well above level of flood water, and there artificial redds can be made without any trouble. But even where no high level springs are found, suitable water service can be easily arranged simply by cutting through a bank where the course of the river bends immediately above a lower level; the head of the cut, protected by stakes and loosely piled rocks, is filled in with gravel, and a roughly built retaining wall holds up the gravel heap, through which the water filters into pipe supplying egg box. Flood water may for a time threaten redds thus formed, but if the egg boxes are well covered the water from filter bed will keep the ova clean, and if the top of the protecting bank we have cut through is above ordinary flood water level the redds and egg boxes are secure from damage.

On the lower reaches of Waterfall River, where the country is flatter and the flow of the stream more sluggish, artificial redds are less easy of construction, and long stretches of the river less suited to the planting of freshly hatched out fry; but the exercise of a little ingenuity can be made to overcome apparent lack of natural facilities, and it must be remembered that all natural stocking is due to fry, heavy sluggish lengths of water far from redds depending on surplus stock dropping down stream or working its way up stream from suitable breeding places.

Co-operation is the motto for neighbouring owners of comparatively short lengths of same rivers. If I owned a stretch of heavy water immediately above or near below the more fortunate possessor of a good bright shallow, I would not hesitate to aid in stocking the said shallow, certain that my fishery would benefit, and that a large proportion of the trout when grown to a takable size would surely seek the deeper water within the boundaries of my fishery.

The Plainfontein, a typical chalk-stream of the south country, well known and fished by the best dry-fly fishermen of the present day, would, one might imagine, be well managed and fully stocked; yet the very opposite state of affairs is the case. Here is a river, the rental value of which should be £100 per mile, much neglected; many of its reaches are keeperless, and so full of pike that very good sport may be had by pike fishers during the winter months.

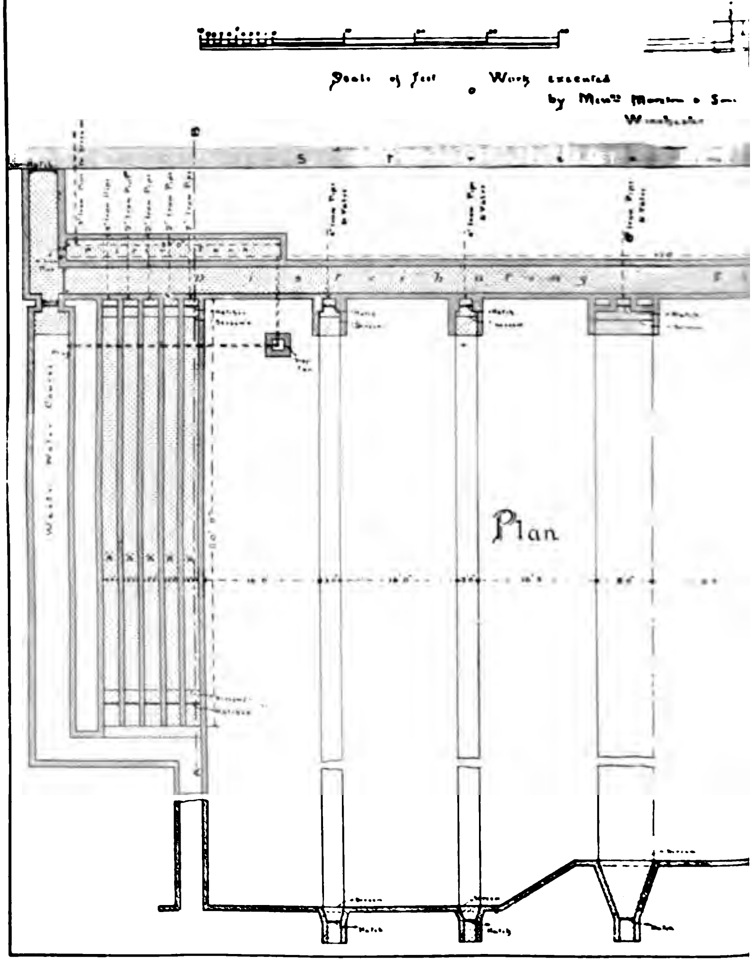
Owners of its few well-stocked portions are disheartened by the apathy and niggardliness of adjoining fishery management, and the following cases will exemplify the difficulties which beset the few energetic fishery owners. Similar cases are numerous, but one or two will suffice to quote here. The first is that of a leaseholder of some three miles of water, who, while heavily stocking his own march, approached the owner of an adjoining fishery with a view of learning what his neighbour's plans might be for re-stocking. "Oh," replied the

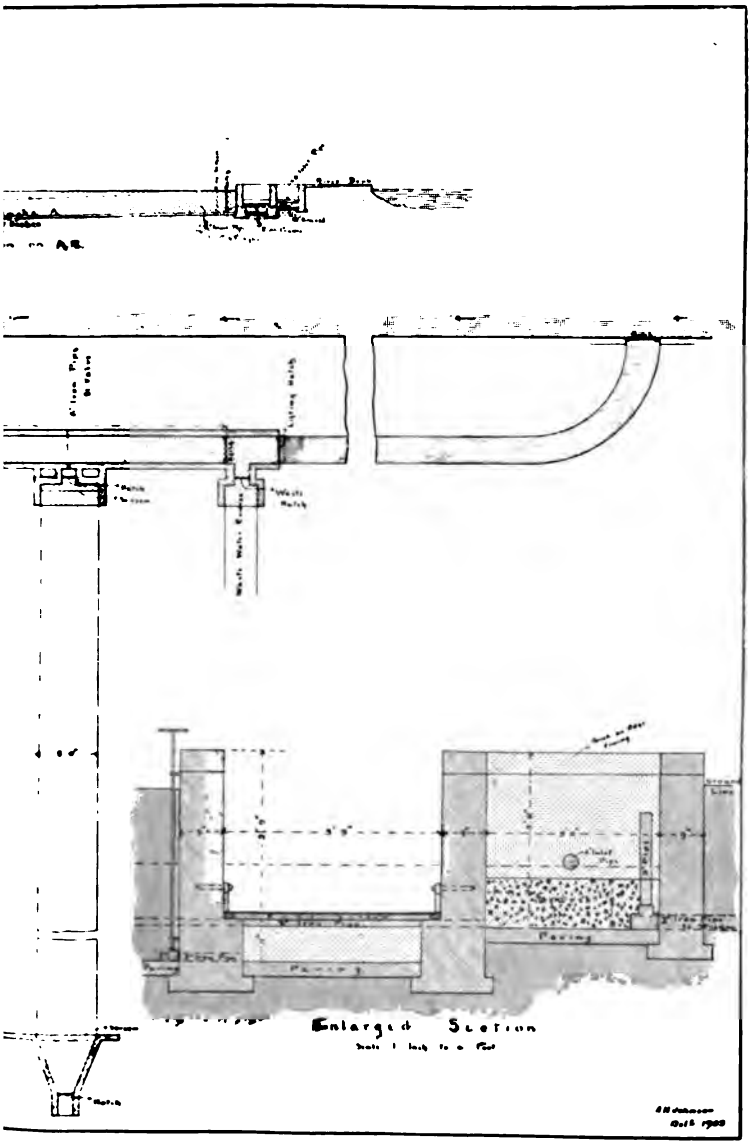


CORRIE'S ARTIFICIAL REDD PLAN.

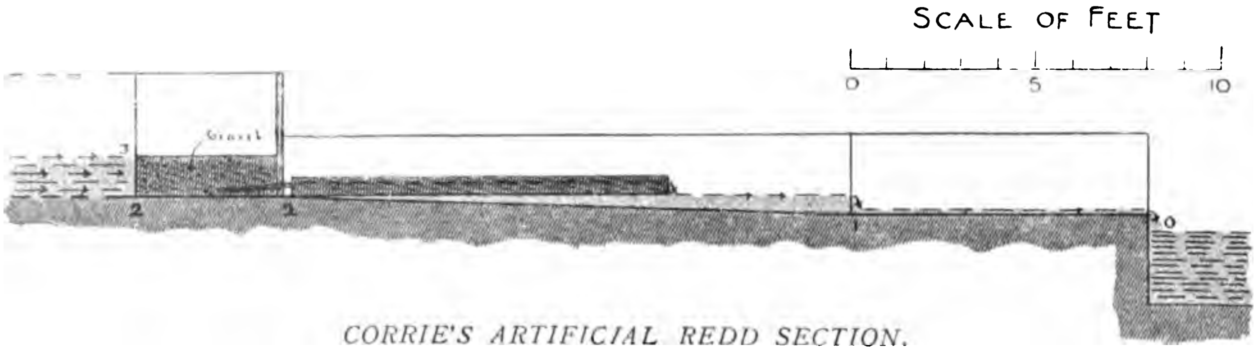
A.—Ditch or pipe bringing water towards Redd. *B.—Perforated zinc screen.* *C.—Filter bed at head of ditch.* ***D.—Retaining wall of filter bed.*** ***E.—1-in. pipe for delivering water into egg box.*** ***F.—Egg box.*** ***G.—Perforated zinc screen.***

Fish Breeding Troughs,
St. Cross Winchester.





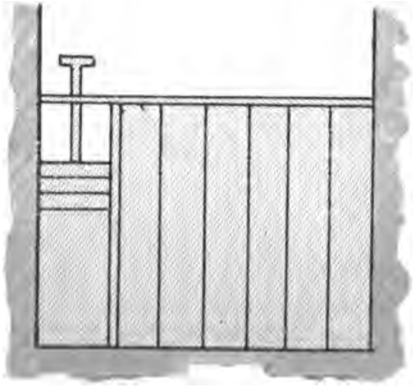
4" Iron Pipe & Valve
Lifting Hatch
Waste Hatch
Waste Water Course
Hatch
3' 9"
9"
4" Inlet Pipe
Paving
Paving
Enlarged Section
Scale 1 Inch to a Foot
E.H. Johnson



CORRIE'S ARTIFICIAL REDD SECTION.

LEVELS.

O.—Lowest drainage level.   1.—6in. above lowest drainage point O.   2.—12in. above lowest drainage point O.   3—24in. above lowest drainage point O.



Cross Section showing retaining wall of Filter Bed.

Scale 1 inch to a Foot

These Drawings illustrate the very least amount of "Fall" (viz. 2ft.) that it is safe to work to when supplying an Artificial Redd with river water by Gravitation, and it must be further reckoned that, when the River being dealt with is subject to a rise of more than 1ft. at drainage point "O," the site chosen for the Redd must possess a correspondingly greater drop in the levels, so that the drainage may always be above flood water.

neighbour, "I don't re-stock any more now you are doing so much in that line." The second example is even more disheartening. On one fishery fry, yearlings, and two-year-olds are regularly turned down, on the next (a hard-fished water) one keeper attempts to tackle two men's work, re-stocking is scanty, and although pike abound, the fishery does not own a net!

As said about the Waterfall stream, so also in the case of the Plainfontein River, co-operation should be the motto.

As far as I am aware, the most successful, thorough, and cheap stocking ever done to a south-country river was effected by turning down fry which were hatched on the banks of the same stream. The work was commenced many years ago on a two to three mile stretch of river then almost troutless, but swarming with pike. The first year the water was taken in hand less than twenty trout were caught, and more than thirteen hundred pike killed. Truly this seemed a dreadful outlook for fry, but in they went. The following season the few matured trout in the water were less pike-scared, and fifty-two were taken with fly and 936 jack killed by every known means of destruction. The following year 132 trout were caught, and some 800 to 900 pike (the exact number of pike killed was not made note of). Many of the 132 trout must have worked down from a neighbour's better stocked water, and, having a less number of pike to escape, came to hand. During the fourth year

250 trout and only 400 pike were taken; fifth year, 361 trout, averaging 1¼ lbs., and 450 pike.

During the second of the five years referred to 300 eight-inch two-year-old trout and 200 yearlings were purchased and turned down. But I now think that the so-called two-year-olds must have been stunted three-year-olds; at all events the wretched things never made 1 lb. fish, and the credit of successful stocking can be fairly given to the fry. It may be thought that, consequent to the killing off of coarse fish, the steady improvement noticed was very largely influenced by influx of trout from the adjoining fishery. How far that may have been the case is difficult to accurately determine, but at the same time does not discredit the fry planting principle, which in previous years had also been the successful means of raising a good head of trout on the adjoining water. The fry raised for re-stocking both the fisheries here alluded to were dealt with in hatcheries of which the water supplies had to be lifted to a working level by hand pumps, yet the cost of turning down 20,000 fry to the mile of water was small, and the result most satisfactory. The treatment of natural redds comes only second to the construction and care of artificial ones, spawners will travel miles in search of a clean redd, but, like other creatures, may be induced to remain at home when properly cared for.

Good natural redds are wonderfully scarce on the Plainfontein, except on some of the upper reaches of the river, and even there they are mostly unsheltered, open to attack from vermin, and often exposed to the danger caused by shutting down of sluices and hatches which control water service to irrigation channels.

To remedy some of these evils I advise thorough raking and cleaning of all natural spawning places. Where they are situated in shallow water, protect them with bushes planted so as to overhang the water, and provide plenty of hides on the down stream side of the redds for the spawners to retreat to when frightened. One of the most simple shelters for spawners, and least noticeable from heron or other poachers' point of view, is a deep hole in the bank, made well down to lowest water level. The hole should go three feet into the bank, be of narrow entrance, and its floor have an upward slope from the entrance, with an air shaft meeting back of hole. In ordinary water meadow soil a hide of this kind can be quickly made by working a short iron bar horizontally into the bank and the air shaft by thrusting the bar downwards through the overhanging ground until it meets back of hole. Out of a hide of this sort I have, at spawning time, taken as many as six large trout, which, had it not been for this shelter, would have enjoyed no safe resting place until, perhaps, hunted hundreds of yards down stream, and scared far from the redd they were just in the humour to honour. A good waterlogged tree root if firmly anchored down is a capital retreat for spawners. In the lower reaches of the Plainfontein natural redds are few and far between, but there are many places where they could be made. Hardly a mile of the valley but we find the main river branching into two or more parallel channels; often one of these is at sufficiently high level above its fellow to permit of running swift little waterways from the higher stream to the lower, and thus perfect redds can be made for wild fish to spawn on. Such channels of about three to four feet in width are quickly cut, gravel laid down, if not already present, and hurdles thrown across the cut until such time as freshly planted bushes have made sufficient overhanging cover. Spawning trout love fast water to work in, and will not fail to make use of every good redd offered them. Where constant and certain attendance of keepers and watchers is assured, it is a good plan to fit the redds with adjustable gratings for fencing off late spawning fish from those portions of the redds where ova has already been deposited, but when dealing with river water the gratings require a great deal of cleaning, or the even flow of water over the gravel is checked, and sediment will at once commence to settle in the very part of the redd which most needs to be kept free of mud.

The Plainfontein River has such a wealth of weed that it never suffers from overcutting, and in most lengths of the stream it forms in dense masses, harbouring numbers of savage pike and gradually accumulating great mud-banks. In the few better managed portions of the river owners of fisheries recognise the fact that in order to kill down pike all weeds, except the very short close-to-the-bottom growing kinds, must once a year be cut as bare as possible. The end of the trout-fishing season is the best time for weed-cutting; then cut fast and cut close and get as much of the pike netting as possible finished previous to the spawning season. Except during the spawning season and while the trout ova is hatching out, some weed-cutting should be more or less in progress all the year round, never making a clean sweep of any one part of the river, but by constant cutting in patches and bars encourage an equally constant growth of fresh weed. Thus mud and debris have less chance of hanging up, enough cover is left for protection of natural food, and ample shelter for trout.

The artificial redds, of which drawings appear in this chapter, are designed for receiving fully-eyed ova, which may be purchased in quantities from most of our large piscicultural establishments. Fishery owners, who have not hatching appliances and keepers well practised in the art of handling spawning fish, will be well advised to purchase eggs for any artificial redds they may make, and allow their wild trout to spawn naturally, giving them every encouragement, shelter, and convenience here advocated.

Stocking with yearling and two-year-old trout is now so well understood that I have hardly alluded to it except as an expensive, quick, and sure method where the nature of the water treated agrees with the class and age of the fario turned down; but when buying these fish it is of great importance to choose trout which have, as far as is possible, been raised under similar conditions to those they will have to meet when turned out to fend for themselves.

For instance, if the purchaser of yearlings and two-year-olds desires to stock a quick running stream he is not well advised to turn down fish which have been raised in ponds carrying only a small flow of water. Trout thus raised are pretty sure to drop far down stream when first asked to face fast water. If, however, the river to be stocked is of a sluggish nature fario which have been bred and brought up in slow moving water often do very well and wander little from the neighbourhood where they are turned out, but trout which have been raised in brisk water are generally the most satisfactory to deal with and the most adaptable to new surroundings.

When stocking with fry it is important to remember that they should be hatched in water drawn from the same stream that they are intended to live in. Bought fry hatched in a different locality seldom give satisfactory results, although change of water does not seem to have any ill effect on healthy, fully-eyed trout ova from whatever source it may have been obtained.

In conclusion, I lay great stress on the fact that for successful working of both natural and artificial redds a reasonably pure water service must be

87.—BROUGHT TO THE NET.

88. A DIFFICULT CAST.

present, and where any doubt exists as to pollution the suspicion should be proved groundless before making accommodation for trout ova which, even when fully eyed, is susceptible to many forms of impurities.

CHAPTER XVII

FISHING WITH THE FLOATING FLY

By Frederic M. Halford

Definition

A floating or dry fly is one fished *on* the surface, while a sunk or wet fly is one fished *below* the surface of the stream. This crude definition will, no doubt, convey to the mind of the student some notion of the distinction between these two styles of fly-fishing. If, however, the subject is to be thoroughly explained to the learner, the conditions under which each of the methods is carried out and the means adopted to put them into practice must be considered in detail.

The sunk or wet-fly fisherman has one, two, three, or even more artificial flies on his cast, and they are dressed as spare as possible in body, hackle, and wings when the pattern is a winged one, so that they will soon absorb moisture, become sodden, and sink below the surface. He casts up, across, or down stream according to his fancy, or more often according to the direction and force of the wind. He places his fly or flies on the part of the river where he thinks it probable that the feeding fish will be located at the particular season and under the existing climatic conditions.

His success is largely dependent on three factors: (1) the judgment displayed in the selection of likely spots; (2) his capacity to bring his fly or flies over the water he has selected; and (3) the size and patterns of the flies used. He may or may not see fish feeding on the natural insects, but if he does find rising fish he will, of course, do his best to tempt them by placing his fly or flies within their range of vision. Some work the fly to give it a lifelike appearance, while others simply let it follow its own course through the water.

Fishing with the floating fly is carried out on totally different lines. The first step is to examine the natural flies in the water, and from this examination to arrive at a definite conclusion as to the patterns and size of artificials likely to tempt the feeding trout or grayling. The next step is to see a fish rising at and taking these natural insects on the surface. Not only is it necessary to see but to convey to one's mind a clear conception of the precise spot where the fish is rising.

The fisherman must then decide where he should take his stand to be able to cast to and cover the fish. He must crawl on all-fours up to this place, and to call his position when arrived there a *stand* is somewhat a misnomer. He will have to crouch down, kneel, sit, or lie at full length on the ground so as to keep himself out of sight. The smallest mistake at this stage will relieve his mind of any doubt, as he will in all probability see the trout he is stalking flee in terror and take refuge in the impenetrable tangle of the nearest weed-bed.

His next step is to let out a length of line just sufficient to cover the rising fish, and make a cast with his fly quite dry so that it will float. The flash of his waving rod must not be visible to the trout when drying the fly, recovering the line, or making the cast. The artificial must fall on the water without splash or disturbance and float down over the precise spot where the fish is feeding, at the same pace and following the same course as a natural insect coming to the same fish.

Having achieved all this without a mistake if the trout or grayling is deluded and takes the mixture of feathers or fur on the hook for an edible morsel, if the fisherman strikes at the right moment with sufficient force—and no more—and hooks the fish, and if after this all goes well, the landing net comes into use and the fish, if sizable, is killed. If anything goes wrong, either owing to lack of judgment, bungling, or sheer ill-luck, after hooking the fish, there is not much probability of its coming on the feed again for some little time.

If the first cast produces no result in the shape of a rise one or two more throws may be attempted, and then a rest is necessary until two or three more natural insects have been sucked in. Another point has then to be inwardly debated: whether it is advisable to go on casting with the same fly or whether it is better to make a change. If the latter alternative is adopted, the pattern and size must be determined as well as the question whether the new fly should be an imitation of the same, or one of the other insects on the water, or whether it should be one of the so-called *fancy* patterns.

After a number of changes of fly and frequent periods of rest for the fish, the angler may at length opine that it is not good policy to go on educating this particular member of the great family of Salmonidæ, and decide to abandon this and find another rising trout. Even then he must not stand erect or show himself, and thus scare the fish, but, keeping down, must crawl back from the water so as to remain invisible, and perhaps later on he or some brother-angler on the water may succeed in deluding that cautious trout.

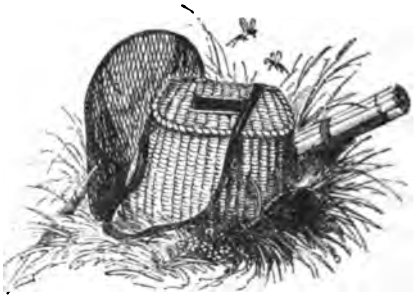
It is the fashion nowadays for the wet-fly fisherman to allude in disparaging terms to the fads and semi-scientific acquirements of the dry-fly man, while sunk-fly fishing is often sneeringly styled "chuck and chance it" by the dry-fly purist. Both are wrong. The skilled wet-fly man does not in any way cast at haphazard, and the past-master with the floating fly has served a long apprenticeship to the use of his rod and the study of the insects. Some are enamoured of one form of the sport while others affect the other form, and surely there is room for all and points to be urged *pro* and *con* on both sides.

Personally I was brought up to the dry fly and never had any great love for the wet, yet when out with an artist in that line I can and do admire his skill and judgment. Rapid rivers in which insect food is not generally plentiful are better suited to the sunk fly, while our Hampshire and other south country chalk streams are the ideal haunts of the dry-fly enthusiast.

It must not, however, be imagined that a visitor to one of the rocky north-country streams, who has practised and possibly prefers the floating fly to any other, will find himself hopelessly beaten except perhaps in the swiftest and roughest water. To fish dry fly in a stream of this description is far from easy, and the trout are not usually seen rising in the strongest rush of the water, yet a trout taking natural flies is at all times and in all places far more likely to be tempted by an imitation on the surface than one below the surface.

Even in the roughest places a winged dun floats down, perhaps whirled over and over by the force of the stream, but seldom if ever so sodden as to sink. Wherever in a rapid stream there is a comparatively still pool it is safe to predict than an extra large trout or two are in possession, and may be seen sailing about looking for and taking any stray insects on top of the water, and in such places fish are often killed by the dry fly while they will not look at the best local patterns when fished wet. The experienced wet-fly fisherman is quite alive to this and at times uses the floating fly with deadly effects, and kills with it fish weighing far above the average of the trout usually killed in the stream he frequents.

An American angler of great experience, writing to me on this branch of the subject, urges me to emphasize as strongly as possible the usefulness of trying the dry fly wherever a suitable piece of water is found, even if there are no natural insects visible on it. He adds:—"In parts of New Zealand and America, where most of the water was too fast and broken for anything but wet fishing, I have often found lengths and places slow enough and smooth enough for dry fly, and managed to have a charming interlude even when no fly was on the water, and have time and again been splendidly rewarded for floating a fly over what wet fishermen call *a likely spot.* Sometimes I have spotted a fish lying on a shallow (once on the Opihi in New Zealand; it was a four pounder), and when a well-cocked fly sailed over it, the result was a bold rise and a kill."



The Anglers Arms

CHAPTER XVIII

FISHING WITH THE FLOATING FLY: PATTERNS OF FLIES

By Frederic M. Halford

The majority of the patterns of flies affected by the modern dry-fly fisherman are intended to be imitations of such natural insects as are at once prevalent on the chalk streams, and are freely taken by the rising fish when floating on the surface of the water. There are also a few so-called *fancy* patterns, which are, as a rule, only adopted by the angler as a last resource when his best imitations of the natural flies have failed to elicit a response from the feeding Salmonidæ.

The most important of these natural insects belong to the family of the Ephemeridæ and throughout this family the eggs are laid in the water, and the larvæ or nymphæ live in the water. In some genera, such as the Mayfly, these nymphæ burrow into the mud; in others, such as the March Brown and Yellow May-dun, they pass their existence at this stage on the underside of flat stones in rapid parts of the river. The nymphæ of the olive, iron-blue and pale watery duns swim freely about over the gravel on the bed of the stream or live among the weeds; the nymphæ of the blue-winged olive crawl about in slack places among the roots of the weeds, and cover themselves with *detritus* so as to be almost invisible.

After the lapse of some considerable length of time, varying perhaps from six months to two or even three years, the nymph swims up to the surface and bursts open its outer skin from which the winged Mayfly, or dun, emerges, and after balancing itself for a short time on the water or on the cast nymphal *exuvium*, flutters ashore. This stage of the Ephemeridæ is styled by modern entomologists, the *subimago*.

After a certain lapse of time, which may be hours or days, largely dependent, however, on temperature, the subimago splits open its outer skin and the *imago*, or perfect insect, emerges. Sexual connection takes place at this stage, and the female later lays its eggs in the water. The work of procreation being completed both sexes fall almost lifeless on the surface, and are carried away by the current. Anglers call the imago of the Mayfly a *Spent Gnat*, while the duns after assuming the imago dress are known as *Spinners*. From this brief life-history it will be seen that the Ephemeridæ are on the water, and hence serve as food for the rising trout and grayling at both stages—the subimago after it has just left the nymphal envelope, the female imago when in the act of oviposition, and both male and female imagines at the last stage of their short lives.

The Caddis-flies (*Trichoptera*) also lay their eggs in the river, and the larvæ when hatched at once commence making cases in which they pass the larval stage. Some genera make portable cases, which they drag about with them, while others fix the cases to heavy stones and go in and out of the cases at their own free will. Some cases are made of fragments of stone, shells, &c., others are made of vegetable matter, and others again partly of stones and partly of fragments of weeds, rushes, or other vegetable matter. In one species of this family the individuals make their cases in the early part of their lives of vegetable matter only, and as they grow the extensions are carried out with stones and particles of sand, so that just before assuming the pupa state the case is almost entirely enveloped in mineral matter.

After a time the larva closes the larger end of the case with a kind of network, and in some genera the larva also becomes covered in a thick brown cocoon. The larva in the case then develops into a pupa; after a time the fully formed pupa, which is enveloped in a thin skin, tears open the network at the mouth of the case, and swims to the surface. The thin skin then splits, and the imago, or winged insect, emerges and flies ashore. A considerable number of angler's flies, such as the numerous Sedge-flies, Grannom, Welshman's Button, and many others, are comprised in the family of the Trichoptera.

Perlidæ, or Stoneflies, are not great favourites with the chalk-stream fish, and hence patterns representing them are not much used by the dry-fly man. The Alder (*Sialis lutaria*) belongs to the family of the Sialidæ. Its eggs are laid on the sedges or rushes on the bank; the larva when hatched crawls into the water, and burrows into the mud, where it remains until it is full-grown. It crawls ashore, makes an oval cavity in the ground a few inches below the surface, and retires into this nest. It then becomes a pupa, and in due time the imago emerges leaving the pupal skin behind. The fly itself is never voluntarily on the water, but its imitation has been a favourite with fly fishermen from the time of Kingsley to the present day.

A certain number of Diptera are also taken by the fish, and of these some have aquatic larvæ and others are attracted by the water or blown on to it by the force of the wind. Occasionally winged ants, Aphis, and other little insects are present in sufficient number to tempt the ever-hungry Salmonidæ.

Before describing the dressings of the various patterns, it is necessary to devote some space to the consideration of what is perhaps the most burning question among the fly fishermen of the present day. In the *Field* of June 19, 1897, Sir Herbert Maxwell summarised the result of experiments with Mayflies of startling and abnormal colours that in his opinion "either fish do not perceive the difference between the coloured rays reflected from or transmitted through objects, or, if they perceive them, they disregard them."

It is said that Sir Herbert Maxwell himself has since in part recanted this theory of colour-blindness, and Mr. C. E. Walker and others have proved that colour perception is in some greater or less degree present in fish. Some anglers of great skill and experience are fully convinced that fish can differentiate the most delicate gradations of colour, and that the fly-dresser's ideal should be to reproduce the exact shade of each part of the natural insect in the corresponding part of the artificial he is dressing.

I must confess that the *colour-blind* theory has never impressed me very strongly, but at the same time I cannot unreservedly endorse the views of those who think that the invariable cause of fish coming short to a fly is that its colouration is not a dead match to that of the natural insect. The nearer, however, the colours approximate to nature the more artistic and better looking is the appearance of the artificial, and nothing tends more to the success of a pattern than the confidence of the fisherman using it.

Practically all modern floating flies are tied on eyed hooks, and the parts of them are composed of feathers, quill, dubbing, and such materials generally as are not darkened in colour by moisture. Most patterns can be dressed either with wings or hackled, and the hackle flies float quite as well and are as deadly in effect as the winged patterns.

No. 1.—GOLD-RIBBED HARE'S EAR.

(Plate 89, facing p. 316.)

Wings.—Medium or dark starling.

Body.—Dark fur from hare's face, ribbed with fine flat gold.

Legs.—Dark fur from hare's face, worked as a hackle.

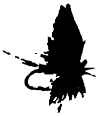
Whisk.—Gallina, dyed brown red.

Hook.—0, 00, or 000.

For the hackle variety of the same fly the starling wings are omitted, and a blue dun hen hackle at the head and a grizzled blue dun cock hackle at the shoulder substituted. These patterns are the most killing ones for fish *bulging* at nymphs and only taking occasional winged duns. They are also great favourites with many fishermen for general use over trout or grayling feeding on the winged olive duns.

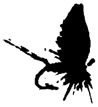
TROUT FLIES (FLOATING)

Nº 1



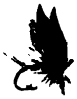
[illegible]d Hares Ear

Nº 2



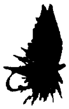
Olive Quill

Nº 3



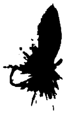
Pale Watery Dun

Nº 4



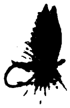
[illegible] Ear Quill

Nº 5



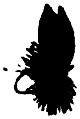
Little Marryat

Nº 6



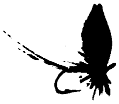
Ginger Quill

Nº 7



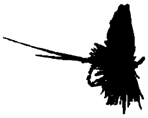
[illegible] Blue

Nº 11



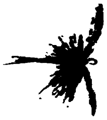
Blue Winged Olive

Nº 12



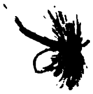
Red Quill

Nº 13



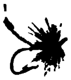
[illegible]d Spinner

Nº 14



Detached Badger

Nº 15



Jenny Spinner

PLATE 89.

No. 2.—Olive Quill.

(Plate 89, facing p. 316).

Wings.—Medium or dark starling.
Hackles.—Two cock hackles, dyed to olive shade required.
Body.—Condor or peacock quill, dyed to shade.
Whisk.—Gallina, dyed olive.
Hook.—0, 00, or 000.

When dressing the hackle varieties substitute a medium or dark blue dun hen hackle for the starling wings.

The olive dun is present in great numbers on every chalk stream from the early spring to the end of the fishing season. It varies slightly in colour, but two or at the outside three shades of olive hackles and body, with wings to accord, will be found sufficient. The olive of this fly is a curious tone, neither brown nor grey nor green nor yellow, but a combination of all these colours.

No. 3.—Pale Watery Dun.

(Plate 89, facing p. 316.)

Wings.—Pale starling.
Hackles.—Two cock hackles, dyed pale lemon green olive.
Body.—White horsehair, dyed a faint canary worked on a bare *blue* hook.
Whisk.—Pale olive gallina.
Hook.—0, 00, or 000.

The hackle variety is dressed with a pale blue dun hen hackle at head in place of the starling wings. For a change the body may be made of a strand of grey goose quill, dyed a pale lemon green olive.

No. 4.—HARE'S EAR QUILL.

(Plate 89, facing p. 316.)

Wings.—Pale starling.
Hackle.—Hare fleck worked as a hackle.
Body.—Condor or peacock quill, dyed a pale canary.
Whisk.—Pale olive gallina.
Hook.—0, 00, or 000.

No. 5.—LITTLE MARRYAT.

(Plate 89, facing p. 316.)

Wings.—Palest starling.
Body.—Fur from flank of Australian opossum.
Hackles.—Two pale buff Cochin cock hackles.
Whisk.—Pale olive gallina.
Hook.—0, 00, or 000.

With body of peacock, bleached slightly in hydrogen peroxide, and dyed to the *café au lait* colour of the opossum fur, the pattern is called the Quill Marryat.

No. 6.—GINGER QUILL.

(Plate 89, facing p. 316.)

Wings.—Pale starling.
Hackles.—Two pale ginger cock hackles.
Body.—Well-marked strand of peacock, undyed or slightly dyed with red-brown.
Whisk.—Gallina, dyed pale red-brown.
Hook.—0, 00, or 000.

As the weather becomes warmer, and throughout the summer and early autumn, the Pale Watery Dun is generally more prevalent than the Olive Dun, and the patterns, Nos. 3, 4, 5 and 6, are the best artificials to use when the fish are feeding on these Pale Watery Duns.

No. 7.—IRON-BLUE.

(The female is shown in Plate 89, facing p. 316.)

Wings.—Tomtit tail, or dark starling dyed to a similar tint.

Body.—Condor or peacock, dyed purple for the female, or brown-olive for the male dun.

Hackles.—Two dark honey dun cock hackles for the female, or two cock hackles, dyed olive-brown, for the male.

Whisk.—Dark undyed gallina for the female, or gallina dyed brown olive for the male.

Hook.—00 or 000.

A variety of the Iron-blue is dressed similarly to the above in all other respects, but with body of mole fur ribbed with yellow sewing silk.

No. 8.—ADJUTANT BLUE.

Wings.—Coot.

Hackles.—Two dark honey dun cock hackles.

Body.—A strand of Adjutant quill, undyed.

Whisk.—Dark gallina, undyed.

Hook.—00 or 000.

Any of these patterns can also be dressed with a dark blue dun hen hackle at head in place of the wings. On some rivers, such as the Test, the Iron-blue is seen in great numbers throughout the season, and is in these rivers a very deadly fly. The patterns, Nos. 7 and 8, and their varieties, are the best imitations extant.

No. 9.—BLUE QUILL.

Wings.—Medium starling.
Hackles.—Two honey dun cock hackles.
Body.—Undyed peacock quill.
Whisk.—Medium gallina undyed.
Hook.—0, 00, or 000.

No. 10.—BLUE DUN.

Wings.—Snipe.
Hackles.—Two pale blue dun cock hackles.
Body.—Pale mole fur spun on yellow silk.
Whisk.—Pale undyed gallina.
Hook.—0, 00, or 000.

Nos. 9 and 10 and the hackle varieties of the same are old standard patterns, and are at times very successful. Probably there is no natural insect of this colour, and certainly the text-books give no British Ephemeridæ at all resembling it in tint.

No. 11.—BLUE-WINGED OLIVE.

(Plate 89, facing p. 316.)

Wings.—Coot.
Hackles.—Two cock hackles, dyed green-olive.
Body.—Grey condor or peacock, dyed green-olive.
Whisk.—Medium gallina, dyed green-olive.
Hook.—0 or 00.

The Blue-winged Olive is a summer and autumn fly, and is quite distinct from the ordinary Olive Dun. It is generally seen in the evening, and even quite late at night, and both trout and grayling take it fairly well at times. It is not, however, as well appreciated by the fish as the Olive, Pale Watery, and Iron-blue Duns.

No. 12.—Red Quill.

(Plate 89, facing p. 316.)

Wings.—Pale or medium starling.
Hackles.—Two red game cock hackles.
Body.—Peacock quill, dyed red-brown.
Whisk.—Gallina, dyed red-brown.
Hook.—1, 0, 00, or 000.

No. 13.—Red Spinner.

(Plate 89, facing p. 316.)

Wings.—Two blue dun cock hackles set on horizontally.
Hackles.—Two red game cock hackles.
Body.—Peacock quill, dyed red-brown.
Whisk.—Gallina, dyed red-brown.
Hook.—0 or 00.

This pattern is generally known as Mr. Williamson's, as it was suggested by him as an improvement on the ordinary Red Quill.

No. 14.—Detached Badger.

(Plate 89, facing p. 316.)

Hackles.—Two badger cock hackles.
Body and Whisk.—Detached, of white horsehair, dyed red-brown, worked over a foundation of doubled split bristle,

also dyed red-brown, and ribbed with crimson silk. Three or four strands of white gallina worked in for whisk.

Hook.—0 or 00.

Nos. 12, 13, and 14 are all imitations of the so-called *Red Spinners* or imagines of the female Iron-blue, female Pale Watery Dun, or of both sexes of the Blue-winged Olive, the last being generally named *Sherry Spinner* by anglers. The largest size of Red Quill is often found more successful than the various patterns of Sedge at the latest part of the evening rise. Any of the winged patterns can also be dressed with dun cock hackles worked at head instead of the upright or flat wings.

No. 15.—Jenny Spinner.

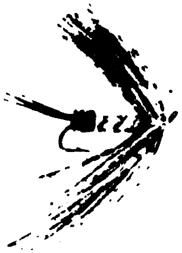
(Plate 89, facing p. 316.)

Hackles.—Two badger cock hackles.

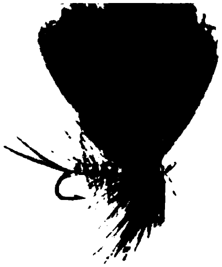
Body and Whisk.—Detached, of white horsehair, worked on an undyed doubled split bristle with four or five turns of deep red-brown silk at the tail end and the same number at the thorax. Three or four strands of white gallina are worked in for the whisk.

Hook.—00 or 000.

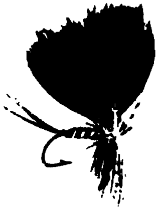
The above is the dressing of the imago of the male Iron-blue. The imago of the male Olive Dun is similar in appearance, but is much larger and the central segments of the body a pale olive, and the horsehair for the imitation of this should, therefore, be dyed to this shade. The Spinner, or imago of the male Pale Watery Dun, is similar in size and



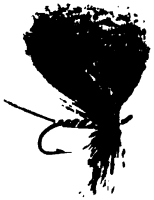
N° 16 *Hackle Mayfly*



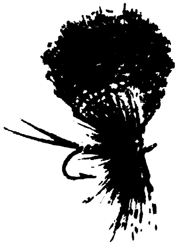
N° 17 *Summer Duck*



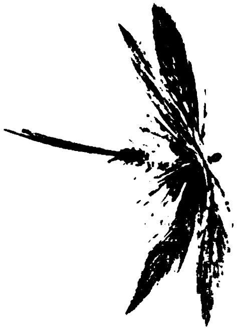
N° 18. *Brown Champion*



N° 19. *Green Champion*



N° 20 *Rouen Drake*



N° 21 *Spent Gnat*

PLATE 90.

general colour to the ordinary Jenny Spinner, but the head and eyes are orange or cadmium yellow and the lower segments of the body are orange, and to imitate this fly the silk used should be of this colour.

No. 16.—HACKLE MAYFLY.

(Plate 90, facing p. 322.)

Hackles.—One or two well-marked darkish feathers from the breast of the Egyptian goose, or Canadian wood or summer duck, with or without a pale ginger cock hackle.

Body.—Pale maize floss silk, ribbed with a strand of peacock sword feather, which is cinnamon at the root, or rofia grass over white quill, ribbed with fine flat gold.

Whisk.—Gallina, dyed dark brown.

Hook.—3 long, 3 or 2.

No. 17.—SUMMER DUCK MAYFLY.

(Plate 90, facing p. 322.)

Wings.—Canadian summer or wood duck.

Shoulder Hackles.—A hen golden pheasant hackle in front, and a pale ginger cock hackle close behind it.

Ribbing Hackle.—A pale ginger cock hackle.

Body.—Rofia grass over white quill, ribbed with fine flat gold.

Whisk.—Gallina, dyed dark brown.

Hook.—3 long or 3.

No. 18.—BROWN CHAMPION MAYFLY.

(Plate 90, facing p. 322.)

Wings.—Gallina or Rouen drake, dyed a distinctly brown-green tint.

Hackles.—A grey partridge hackle, dyed in strong tea, or a hen golden pheasant hackle, and a pale ginger cock hackle.

Body.—Rofia grass over white quill, ribbed with fine flat gold and red silk.

Whisk.—Gallina, dyed dark brown.

Hook.—3 or 2.

No. 19.—GREEN CHAMPION MAYFLY.

(Plate 90, facing p. 322.)

Wings.—Gallina or Rouen drake, dyed a distinct green-olive.

Hackles.—As No. 18.

Body.—As No. 18.

Whisk.—As No. 18.

Hook.—3 or 2.

No. 20.—ROUEN DRAKE MAYFLY.

(Plate 90, facing p. 322.)

Wings.—Well-marked dark Rouen drake.

Hackles.—As No. 18.

Body.—As No. 18.

Whisk.—As No. 18.

Hook.—3 or 2.

The above patterns of Mayfly should be sufficient for any fisherman. No. 16, the hackle pattern, is especially successful at the early part of the Drake season when the fish are feeding on the nymphæ rising to the surface, and only occasionally taking a winged subimago. Nos. 17 and 20 are the best imitations of the female imago just dipping on the water and laying its eggs, and Nos. 18 and 19 are the favourite standard patterns on the Test, Itchen, Kennet, and many other streams.

No. 21.—SPENT GNAT.

(Plate 90, facing p. 322.)

Wings.—Four dark grizzled blue dun cock hackle points set on horizontally.

Hackles.—A grey partridge in front, and a badger cock hackle close behind it.

Ribbing Hackle.—A badger cock hackle.

Body.—A strand of condor quill, dark at point, and white at root, the white part worked in at shoulder to show two or three turns of the dark colour at the tail end of the body. Body ribbed with fine silver wire.

Whisk.—Gallina, dyed dark brown.

Hook.—3 long.

The late Mr. Marryat's pattern of the imago of the Mayfly at the last stage when lying flat on the water. It is most deadly with fish feeding on the natural insect, especially during warm evenings, and it is also useful at times with trout taking Mayfly during the later part of the Drake season.

No. 22.—FISHERMAN'S CURSE.

(Plate 91, facing p. 328.)

Wings.—Pale starling.

Hackles.—Two cock starling hackles.

Body.—A strand of cock golden pheasant tail, or of brown turkey tail.

Hook.—000.

The late Mr. Marryat's pattern. The late Sir

M. Duff-Gordon used a hackle pattern dressed with two cock badger hackles, two or three turns of black ostrich at shoulder, a black silk body and flat silver tag.

No. 23.—BLACK GNAT.

Wings.—Pale starling for the male, and feathers from starling tail with well-marked brown tip for the female.

Hackles.—Two cock starling hackles.

Body.—Peacock quill, dyed black or black quill split from centre of chaffinch tail.

Hook.—00.

No. 24.—CLARET SMUT.

(Plate 91, facing p. 328.)

Wings.—Pale starling.

Hackle.—Black cock hackle.

Body.—Peacock quill, dyed claret.

Hook.—00 or 000.

Mr. E. J. Power's pattern. Nos. 22, 23 and 24 are the best imitations of the Curses, Smuts, or so-called Black Gnats, and are at times successful on the Test, Itchen, and other chalk streams during the summer and early autumn.

No. 25.—RED ANT.

(Plate 91, facing p. 328.)

Wings.—Pale starling.

Hackles.—Two red game cock hackles.

Body.—Grey condor, dyed red-brown; the root of the strand only is stripped, and the point worked on to form butt.

Hook.—0 or 00.

A hackle variety is dressed by substituting a honey dun hen hackle for the starling wings. The Black Ant is a very similar fly with black hackles, black quill body and butt of black ostrich. When the flights of winged ants are on the water, generally late in the summer, these patterns are at times useful.

No. 26.—ALDER.

Wings.—Hen pheasant tail or bustard.
Hackles.—Two black cock hackles.
Body.—Bronze peacock herl.
Hook.—2, 1, or 0.

The hackle variety is dressed with woodcock hackle at head in place of the pheasant or bustard wings. The fly is often found useful, although, as previously stated, the natural insect of which it is an imitation is never voluntarily on the water.

No. 27.—SILVER SEDGE.

(Plate 91, facing p. 328.)

Wings.—Landrail.
Hackles.—Two pale sandy-ginger cock hackles at shoulder.
Ribbing Hackle.—Pale sandy-ginger cock hackle.
Body.—White condor, ribbed with fine silver wire.
Hook.—00, 0, 1, 2, 3, or 4.

No. 28.—HARE'S EAR SEDGE.

(Plate 91, facing p. 328.)

Wings.—Landrail.
Hackles.—Two brown-ginger cock hackles at shoulder.

Ribbing Hackle.—Brown-ginger cock hackle.

Body.—Brown fur from hare's face, ribbed with fine gold wire.

Hook.—0, 1, 2, 3, or 4.

No. 29.—Kimbridge Sedge.

(Plate 91, facing p. 328.)

Wings.—Woodcock.

Hackles.—Two pale sandy-ginger cock hackles.

Ribbing Hackle.—Pale sandy-ginger cock hackle.

Body.—White condor, ribbed with fine silver wire.

Hook.—2, 3, 4, or 5.

No. 30.—Hackle Sedge.

(Plate 91, facing p. 328.)

Head Hackle.—A landrail or brown hen's neck hackle.

Shoulder Hackle.—A sandy-ginger cock hackle.

Body.—Central quill of partridge tail, feather with plumes cut away closely on both sides, ribbed with gold twist.

Hook.—2, 3, or 4.

Nos. 27, 28, 29 and 30 are all excellent patterns of the Sedge (Caddis) flies present on the chalk streams on warm summer and autumn evenings.

No. 31.—Grannom Pupa.

Wing.—A small piece of the point of a brown partridge hackle.

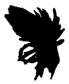
Hackle.—A rusty dun cock hackle.

Body.—Peacock or grey condor, dyed blue-green.

Hook.—1 or 2.

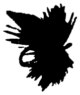
TROUT FLIES (FLOATING).

Nº 22



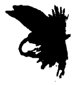
Fisherman's Curse

Nº 24



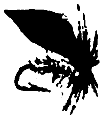
Claret Smut.

Nº 25



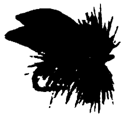
Red Ant

Nº 27



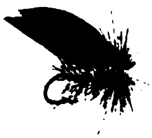
Silver Sedge

Nº 28



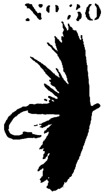
Hare's Ear Sedge

Nº 29



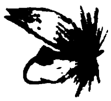
Kimbridge Sedge

Nº 30



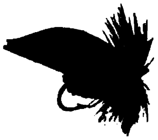
Speckle Sedge

Nº 32



Grannom

Nº 33

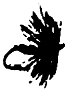


Welshman's Button

Nº 34

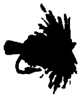
Wickham

Nº 35



Bumble

Nº 36



Red Tag

PLATE 91.

No. 32.—GRANNOM.

(Plate 91, facing p. 328.)

Wings.—Palest hen partridge wing.

Hackles.—Two rusty dun cock hackles.

Body.—A strand of condor, pale grey at point and dark at root; the root part only is stripped, and the entire strand is dyed blue-green. The stripped portion is worked on at shoulder, and the unstripped part at the point forms the bunch of green eggs carried by the female at the tail end of its body.

Hook.—1, 2, or 3.

On rivers or portions of rivers where the Grannom occurs, it generally appears in great swarms during the spring, say from the second week in April to the early days of May, according to whether it is a late or an early season. The pupa swims up to the surface of the water, and there often spins round rapidly until the thin outer skin splits and the winged imago appears. The trout feed ravenously both on the pupa and the mature insect, and under these conditions either of the above-named patterns will be found most killing, perhaps of the two the pupa (No. 31) is often more successful than the imago (No. 32).

No. 33.—WELSHMAN'S BUTTON.

(Plate 91, facing p. 328.)

Wings.—Brown pink feather from underwing of peacock. One of the Indian pheasants has wings of somewhat similar colouration.

best of grayling patterns during the late summer and autumn; in fact, many of the most experienced Hampshire anglers prefer changing the fish to changing the fly when a grayling is not to be tempted with one or the other of these showy fancy patterns.

With a selection of thirty-six patterns and a number of variations in shade, besides the alternative of dressing most of them either winged or hackled, the dry-fly fisherman should not have much difficulty in presenting to a rising fish imitations of the natural insect on which it is feeding. If none of these are acceptable, one or two of the fancy patterns may be tried, but, as a rule, if the feeding trout will not look at the imitations of the natural, it may reasonably be inferred either that the fish is not taking surface food or possibly has been educated or pricked, and hence rendered abnormally shy.

In the case of grayling, perseverance is recommended, and at times fancy patterns are the most killing. It is not an unusual occurrence to cover a feeding grayling ten or twelve times before it rises. It may then rise or come short to the same fly as many as twenty times, and fasten and be killed at the twenty-first attempt.

Whenever the fisherman is in doubt as to the flies on which the fish are feeding, if he can only succeed in killing a single one, he can, as a general rule, ascertain for an absolute certainty by performing an autopsy. Sometimes it is not even needful to cut the fish open and remove its entrails to make the necessary examination, as a little careful manipulation will often extract two or three of the flies just taken by the fish from the back of its mouth or just above the opening to the gullet. In hot weather it is a good plan to open and clean every fish as soon as possible, and rub a little salt into the flesh. A fish so treated keeps fresh much longer, and although slightly disfigured, is yet far better for the table than one which has not been cleaned before being packed or placed in the basket.

CHAPTER XIX

FISHING WITH THE FLOATING FLY: THE ROD AND TACKLE

By **Frederic M. Halford**

The vexed question of single *versus* double-handed rods for dry-fly fishing has been fully thrashed out, and whatever force the arguments of the double-handed school ever possessed has been seriously diminished by the stern logic of facts. At the present time practically all chalk stream fishermen use the single-handed rod, and this may be taken as the most decisive judgment in its favour. As to length, the tallest and most muscular man cannot, even for Mayfly fishing in a wide river, require anything beyond eleven feet, while many of the most skilled modern dry-fly fishermen prefer rods of nine feet, nine and a half, or at the outside ten feet.

Hickory, greenheart, and whole cane have been abandoned by the old hands in favour of glued cane, with or without steel centre, as the materials of which dry-fly rods are made. Personally I am not greatly impressed by the qualities imparted to glued cane trout rods by the steel centre, but, on the other hand, there are many first-rate judges who consider that the addition of the steel core is advantageous both to the action and to the power of a fly rod.

Latterly there has been some discussion as to the weight of rods both in the Sporting Press and at many convivial and other meetings of those interested in dry-fly fishing. Some have advanced the theory that our English-made rods are unnecessarily heavy, and that the 5 oz. or 6 oz. rods manufactured in America are as powerful as the 10 oz., 11 oz., or 12 oz. rods turned out in this country. Much stress has been laid on records of extraordinary distances cast by fishermen in the United States in competitions when using these very light rods. It is, however, well to bear in mind that these competitions create a demand for implements designed to cast very long distances, one of the salient points in the competition being that the rods are classified according to weight. As a natural result everything is sacrificed to a combination of power and extreme lightness, and the rods made for such a purpose are not in any way suitable for the practical work of dry-fly fishing.

What object is served by being able to place a fly on the water at a distance of perhaps thirty-five or forty yards from the fisherman? Are such casts ever really required; and, if accomplished, is it possible for any one to fish a dry fly on such a length of line in the manner required to tempt a shy trout or grayling in a south-country chalk stream? It may be confidently asserted that the man who can throw twenty to twenty-five yards of line accurately and lightly can cover any Hampshire trout likely to rise to his fly, and during a day's fishing very few casts exceeding fifteen yards are likely to be necessary.

At the same time there are undoubtedly points to be urged in favour of reducing the weight of our rods to some extent, but in this respect our friends on the western side of the Atlantic have probably steered too close to the wind. The cane, the glue, the varnish, and the silk for whipping are identical here and in America, so that any reduction of weight can only be effected in the ferrules, rings, and other metal fittings. Either a lighter metal must be used or the thickness of the metal parts themselves must be diminished. In this, as in most other modern methods of manufacture, we have probably been too conservative, and use unnecessarily

92.—A POLITE INVITATION.

93.--LOWER CHILLAND HOUSE.

stout material, while our American trade rivals have possibly gone to the other extreme and adopted unduly thin and flimsy metal. The difficulty is to hit upon a happy medium of strength, or one that will give a properly made rod the chance of lasting well, and yet not making it so heavy as to unduly encumber the hand using it.

Mere weight does not exhaust the question, the lightest rod is not of necessity the least tiring one; and the action, balance, and general handiness of a rod must be considered quite as much as, or even more than, the number of ounces avoirdupois it registers. The action should be true and uniform, the pace of the rod should be fast or slow according to the taste of the man wielding it, and the diameter of the handle should be proportioned to the size of the fisherman's hand.

Formerly rods were far too limber and far too slow, but gradually, as the thickness of the reel line has been increased, stiffer and quicker action in the rod has been adopted, until at the present time the tendency of modern fishermen inclines to an implement which is unduly stiff and over quick in its action. The principles of testing and comparing rods are laid down in full detail in "Dry-Fly Fishing in Theory and Practice," and I would earnestly beg of the amateur to study these principles, and apply them when selecting a rod for his use or when getting one made to match an old favourite.

The modern reels are made of brass, ebonite, aluminium or some of its alloys. Those made of brass are cheaper and heavier than either of the others, and ebonite is more brittle than aluminium. Most fishermen prefer a check on their reels, and check reels can be made either silent or giving forth the discordant click which to many, from its association with a hooked fish, is not altogether disagreeable. The general tendency of tackle-makers is to send out reels with far too powerful a check, which is often productive of a smash when striking a heavy fish.

Reel lines should be of pure silk, plaited solid, and dressed in boiled oil under an air-pump, in accordance with the principles laid down by Mr. Hawksley, and given *in extenso* in "Dry-Fly Fishing in Theory and Practice."

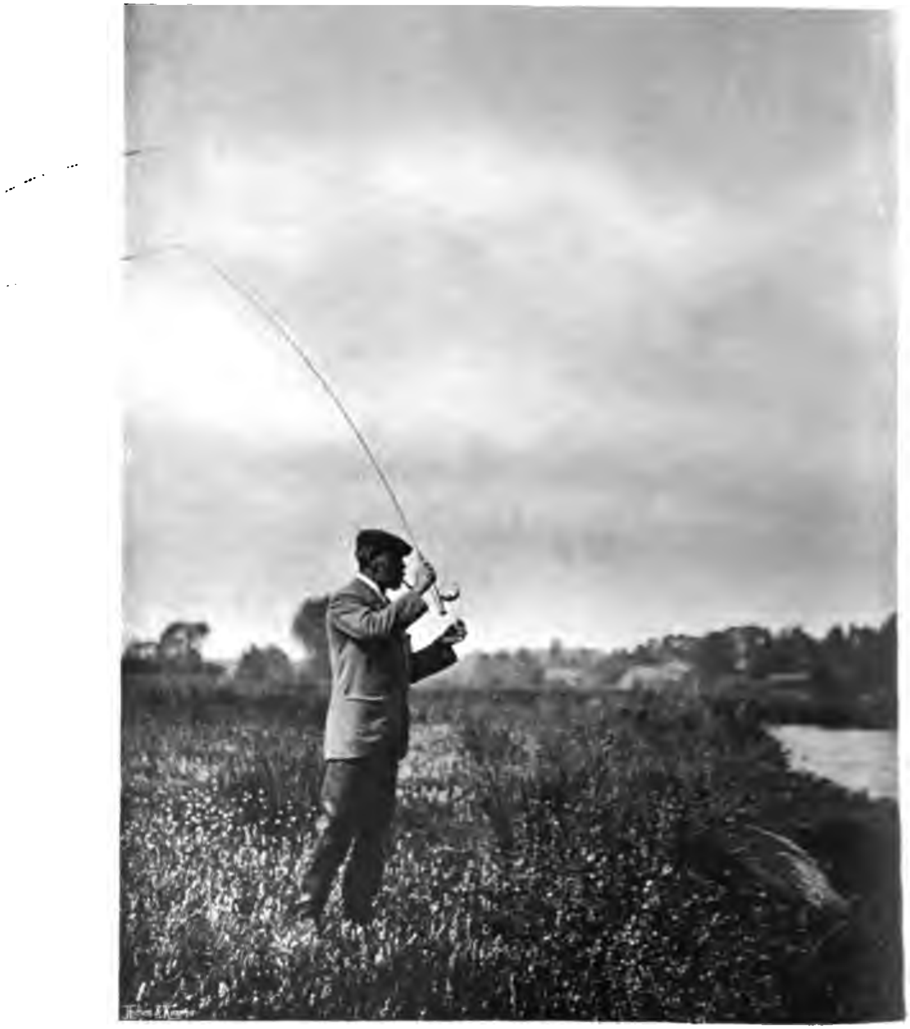
The line should be rather thick, but caution is advised, as most of the shopkeepers try to induce their customers to fish with lines far too heavy for their rods. It is impossible to describe it in print, but a line is required which is exactly of the right substance to bring out the best work of each rod, and an error on either side (*i.e.* too light or too heavy for the rod) will severely handicap even the best performers. The line must be tapered from the maximum thickness to a comparatively fine point, and this taper should be from four to six yards in length. It is economical to have a taper at each end of the line so that when one end is worn, the line can be turned and the taper at the other end used.

At the end of the line a short length of stout gut should be whipped on and looped at the extremity. The heavy end of the gut collar is then looped on to this. If the angler objects to this trouble he can fasten the reel line to the loop of the collar by a bend, figure of eight, or other suitable knot. The collar or cast must be tapered from quite stout gut at the loop to the finest undrawn gut at the point. Very few of the modern dry-fly men use drawn gut at the present time. The cast should measure from four yards to two and a-half, the longest length for fishing down wind in a heavy gale and the shortest for casting against a strong wind.

Gut must be soaked before use or before knotting up, and many fishermen carry a small reserve in a flat box with wet felt or other substance so as to keep it soft and supple. When purchasing gut there is only one piece of advice to offer. Go to the best of dealers only, buy the very best they have, and do not grumble at the price. The very best quality of gut is somewhat of a fancy article, and the stock of it produced each season is quite insufficient to satisfy the demand. A few shillings saved in the price of a hank of gut may often mean the loss of the very best day in the season, and seeing how costly everything connected with the sport has become it is certainly false economy.

Flies are carried in books, boxes, and receptacles of endless variety, each of which suits the idiosyncrasies of some of us. One of the best sportsmen I ever knew carried his flies loose in an old tobacco-tin, and another kept them, a few of each pattern, stuck into a narrow slip of paper, and pinned these slips of paper into an old cigar-case on the inside of which a sheet of flannel was sewn. The worst possible method of keeping flies is to stick them into the left sleeve of one's jacket or to the outside of a cap, as exposure to light invariably bleaches the feathers, &c., and the moisture rusts and in time destroys the temper of the hooks; still there are fishermen, and good ones too, who invariably carry their flies in one of these ways.

A fish-basket or a bag is more cleanly and altogether more convenient than one's pockets for tackle, lunch, flask, or fish; and a pair of scissors, a spring balance, and *priest* to put the fish out of their misery are almost necessities. Waders, macintoshes, and such waterproof gear are strongly recommended to all who do not wish to spend their old age crippled by rheumatism and similar afflictions, and woollen clothing should be worn both for comfort and from motives of hygiene.



94.—*THROWING THE FLY: BACKWARD POSITION.*

CHAPTER XX

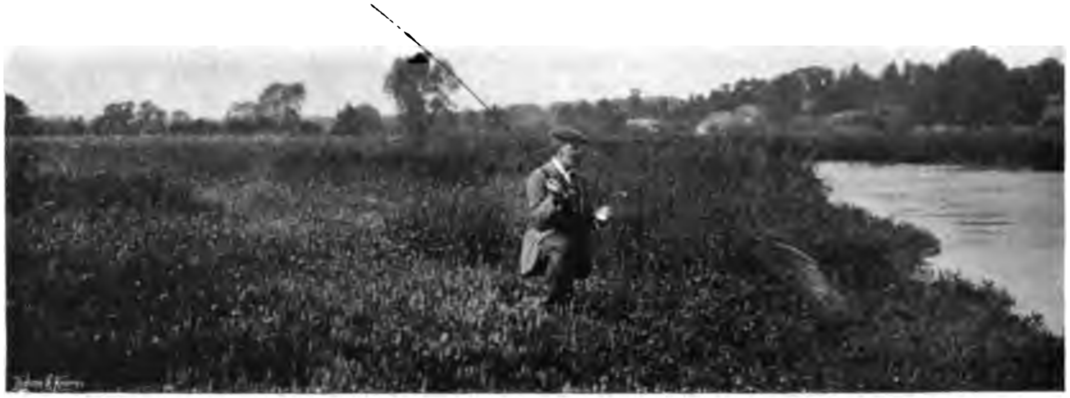
FISHING WITH THE FLOATING FLY: THROWING THE FLY

By FREDERIC M. HALFORD

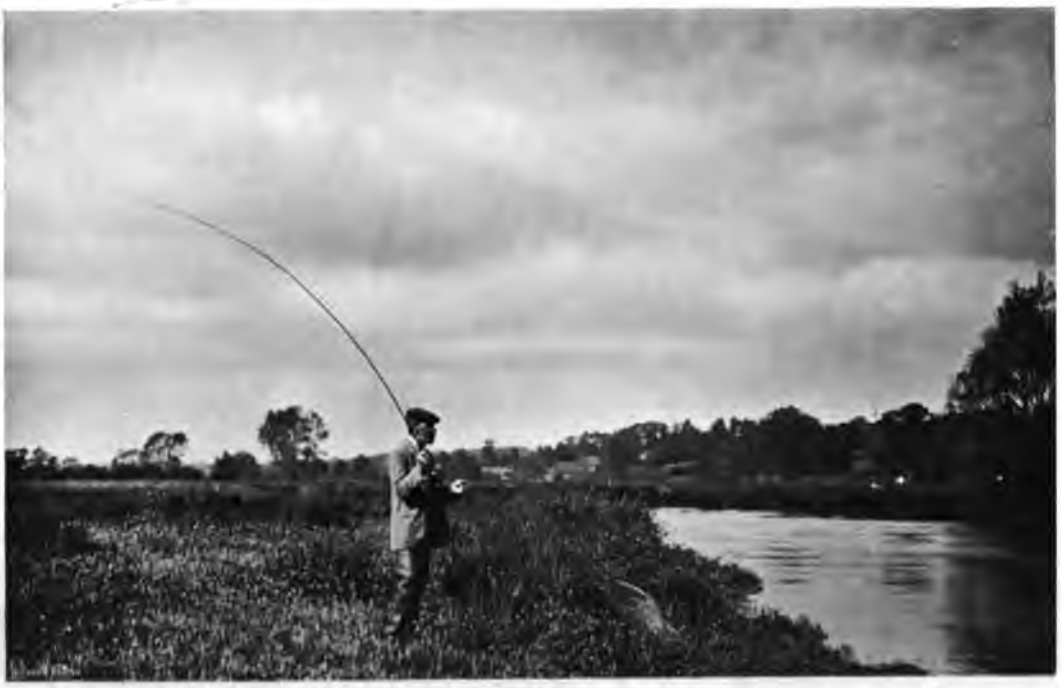
IT is often said that the art of throwing a fly cannot be learnt from a book, and this is, no doubt, to some extent true. The tyro is generally advised to take lessons from a professional or first-rate amateur, but unfortunately it is only given to a small minority of experts in this and other sports or pastimes to be able to impart to others the knowledge they possess. The principles can certainly be laid down in print, and the beginner must try to master these principles as the first step, and later on can attempt to carry them out under the guidance of an old hand. If he has the capacity and a strong desire, and can readily correct his faults from the hints of his mentor, he can hope in time to become an adept himself.

The student must disabuse his mind of a number of erroneous notions. It is not, excepting under most exceptional circumstances, necessary to cast an abnormally long line, and competitions for long casting have nothing whatever to do with fly-fishing. Casting competitions, as previously explained, are generally gained by those using rods and lines made for the sole purpose of lifting and delivering an unusually great length of line, and the rods and lines designed for such work cannot be considered ordinary working fly rods and lines.

The object of a dry-fly fisherman is to be able to place accurately and delicately at the first attempt a single floating fly on the stream, so that it will drift down over the exact spot where a fish has been seen to rise and take a natural insect off the surface of the water. The test of good and effective throwing is to be able to carry out this proposition regardless of the direction or force of the wind or of the speed or trend of the current. The importance of being able to do one's very best with the first cast over a



95—THROWING THE FLY: BACKWARD POSITION AFTER DROPPING HAND.



96.—THROWING THE FLY. COMING FORWARD

feeding trout or grayling cannot by any possibility be overrated.

Let us suppose that the beginner is equipped with rod, line to fit his rod, cast, and fly. He must grasp the rod with the second, third, and fourth fingers of his hand, pressing the handle firmly against the ball of the thumb. Most fishermen keep the thumb extended up the butt, but some few prefer to keep the thumb and forefinger in this position. Personally I use the thumb only, but my friend the late Mr. G. S. Marryat used both thumb and index for this purpose, and as he was the very best exponent of the dry fly in his day I am loth to criticise his practice.

The pupil's first lesson should be devoted to mastering the ordinary over-handed cast. A short length of line, say six or eight yards, should be let out, and holding the rod in one hand and the fly in the other he should raise his hand slowly so as just to feel the weight of the line when he should let the fly go. As soon as the weight of line is just commencing to deflect the rod point backwards—noting that at this stage the rod must never be inclined backwards much beyond the perpendicular—he should commence making the cast. The rod is then brought at a slightly accelerated pace but still quite slowly forward, and as the line is extended the hand is gradually lowered, and the fly should be delivered on an imaginary plane about two to three feet above the level of the water.

The hand must not be worked backwards and forwards along the same line when casting, but a slightly curved or horse-shoe shaped motion must be imparted to prevent the rod when coming forward from colliding with the reel line on its backward path. The timing of the throw is most important, and must be in a great degree dependent on the natural pace of the rod. The force required, although also to a limited extent dependent on the action of the rod, is in every case very slight. It may be laid down as an axiom that every fly fisherman is inclined to hurry his rod and put too much power into it, and the past-master's silent advice to himself when his casting is not up to his true form is always "Slower and less force."

The over-handed cast as described is used only on a dead calm day, or when throwing down wind, and just as the line is extended over the water a slight check is required to make the fly fall lightly on the water with some degree of slackness. This check is imparted in one of three ways: (1) by drawing the hand holding the rod slightly back towards the body; (2) by pulling in a short length of line with the other hand close to the reel; and (3) by slightly tightening the grasp. Whichever plan is adopted the check must be applied at the right moment when the fly has not quite reached its full distance in front. The reason for checking the fly is that if it is forced out in a straight line to its fullest extent it falls on the water with more or less splash, and the tight line causes the fly to *drag* at the moment it reaches the water. The question of drag, the necessity for preventing it, and the method of preventing or retarding it are treated in the next chapter.

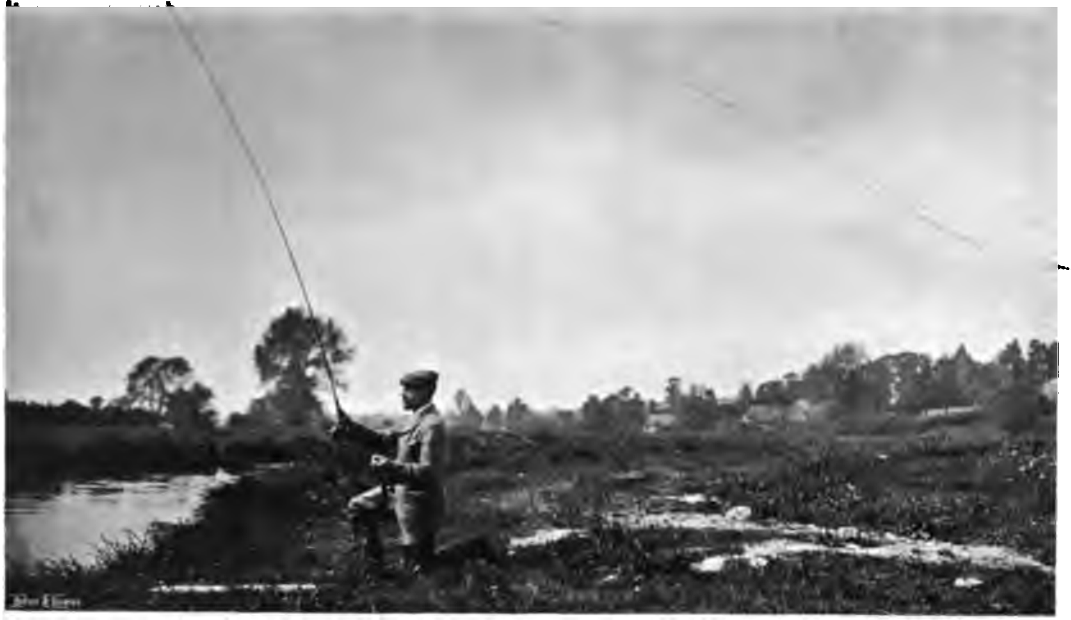
It was originally suggested by me that drawings should be made from the plates used to illustrate the chapter on casting in "Dry-Fly Fishing" to show the position of the rod and form of line at successive stages of the ordinary over-handed cast. These plates were accurately copied from instantaneous photographs of the late Mr. G. S. Marryat casting. The proprietors of *Country Life*, however, suggested that a new series of photographs should be made for the purpose of illustrating this volume, and commissioned Mr. W. A. Rouch to take the necessary snapshots. With the very best and most rapid plates, and all the latest improvements in lenses, shutters, &c., in the hands of probably the most skilful manipulator of the day, it was hoped that photographs capable of reproduction in half-tone would be obtained, and these hopes were fully realised.

The initial difficulty was to discover a dry-fly fisherman who was at once able and willing to devote the necessary time to the labour of throwing while the photographer "pressed the button" at the psychological moment for each stage of the cast. I was most fortunate in persuading Mr. E. Valentine Corrie to undertake this part of the work.

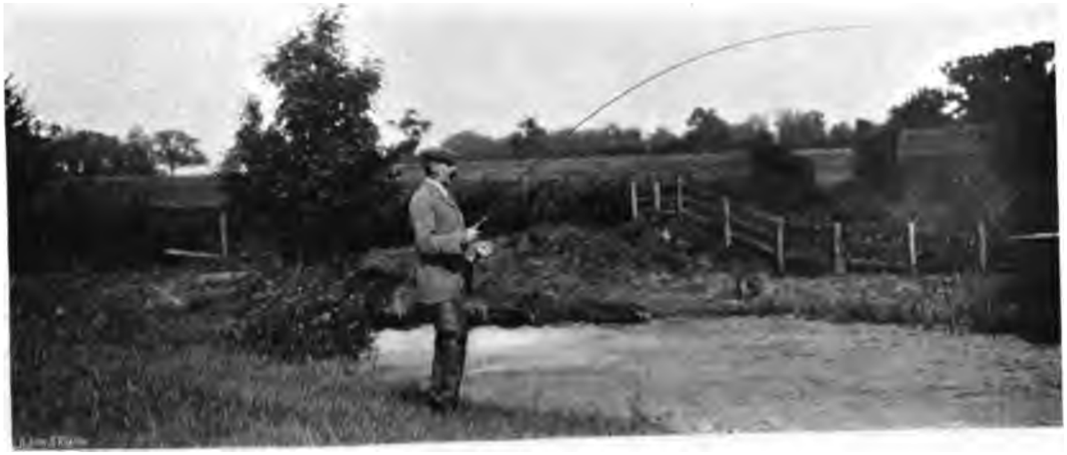
I would ask the reader to compare the plates showing Mr. Corrie's casting, with those given in "Dry-Fly Fishing." It will at once be apparent that Corrie's style is quite different to that of the late Mr. Marryat. Marryat returned his fly slowly well beyond the vertical in the backward action to a point at which he made a dead stop. After a momentary pause he brought the rod forward at a very slightly accelerated speed with more of a swing than of a throw, until arriving at the forward position, where he stopped dead, perceptibly tightening his grasp of the rod. His line was returned generally at a level below that of the rod point, and showed a distinct loop at the backward position, and while coming forward.

Corrie returns his fly well above the rod point, and makes a distinct pause when his rod is a little beyond the vertical, and as he just begins to feel the weight of the line, carries his hand further back. He then commences the forward motion of casting, using a fair amount of force. When at the forward position he again stops, and after a distinct pause drops his hand further forward. His line in returning is all above the level of the rod point, and therefore there is no loop.

Plate 94 shows his attitude and the form of the rod and line at the backward position just as he is commencing to drop his hand. Plate 95 represents the most backward position after he has dropped his hand, and it will be seen that the action of dropping the hand decreases the backward strain on the rod. At Plate 96 he is coming forward,



97.—THROWING THE FLY: FORWARD POSITION.



98 THROWING THE FLY. FORWARD POSITION AFTER DROPPING HAND.

and at Plate 97 has reached the forward position at which he pauses before dropping the hand, while the extreme forward position after the hand has dropped is illustrated at Plate 98.

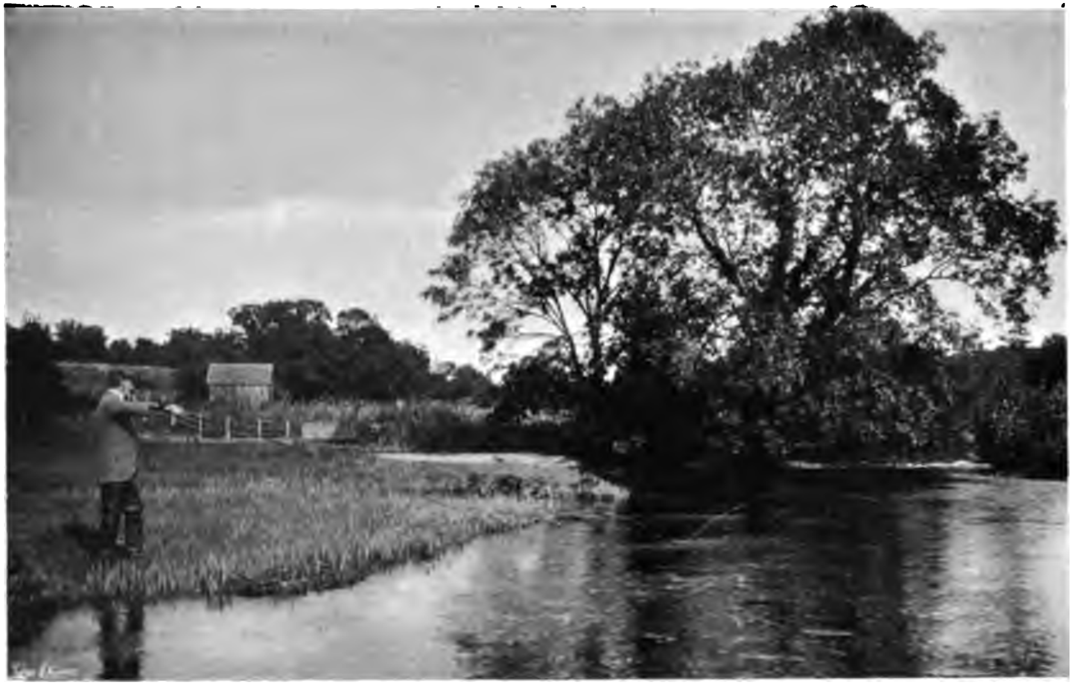
I have treated in some detail as to the marked difference in style between the casting of the late G. S. Marryat and that adopted by Corrie. It must be remembered that the former was, and the latter is, quite in the first rank of performers with a single-handed rod, and either of them could place a fly accurately and delicately over a rising trout at the first attempt, no matter what was the direction of the wind, and without consideration of its force so long as it fell short of an absolute hurricane.

All the old theories of waiting until the line is fully extended behind before commencing to make the cast were utterly exploded by the previous set of photographs of Marryat casting taken in 1888, and if any corroboration was required these snapshots of Corrie, whose casting is in a totally different style, would be ample.

As before noted the over-handed cast is successful only with no wind or a favourable wind. With a strong adverse wind the *downward cut* is required. When making this cast the backward motion and the early part of the forward motion are carried out precisely as with the ordinary over-handed cast. Instead of finishing the cast with the arm bent and the hand in a nearly horizontal position slightly above the level of the waist, the arm is "extended to full length forwards, the knuckles turned downwards, and a drawing circular cut in towards the body made as the line is delivered, the elbow being slightly raised at the same moment, and the point of the rod brought down to the level of the water." The position is shown in Plate 99.

It is most important that the finish of the cast should be made with the rod point close to the surface of the stream. A very general fault is to finish the cast in the air, and drop the rod point afterwards, and then perhaps to find fault with the teacher, and declare that it is not a successful method. If only correctly timed and not hurried, and if too much power is not put into the act of throwing, the fly will travel straight out in the teeth of anything short of a gale of wind. Here again, when the fisherman finds he is failing to get the fly against the wind, let him silently repeat the maxim—"Slower and less force."

The check as described for the over-handed cast is again quite necessary, and the grasp of the hand holding the rod should be as firm as possible; in fact, it is almost impossible to grip too tightly when using the downward cut to propel the fly against a strong breeze. The pupil will find that the acquirement of the knack of making this cast will take considerably longer than with the over-handed cast. It is, however, all-important that the dry-fly man should be independent of the force or direction of the wind. I am not at all sure that it would not be well for a pupil to perfect himself in



99.—*THROWING THE FLY: THE DOWNWARD CUT.*

the art of casting against the wind as the very first step in his education. Perhaps it may savour of the impolicy of trying to learn to run before you can walk.

Having mastered the art of casting against the wind by the downward cut, the pupil has now to study and acquire the horizontal or under-handed cast, the most important and in some respects the most difficult cast of all. This cast is, in fact, precisely similar to the ordinary over-handed one and the action is identical in every way, except that the rod moves in a horizontal instead of a vertical plane. The rod is held nearly parallel to the surface of the stream and kept in this position during the backward and forward motion. It can be readily understood that to one used to the ordinary method of wielding a fly rod the use of a fresh set of muscles in throwing produces cramp and other pains in the forearm, wrist, and hand, and considerable practice is required before it can be accomplished without inconvenience.

When learning the under-handed cast it is advisable to make a point of returning the fly above and casting under the rod. Not only is the cast easier when made in this way rather than the more usual one of returning under and casting over the rod, but it places a lighter fly on the water, and assists the operator greatly in cheating the wind. It is also of great advantage when throwing under boughs overhanging the stream, as it puts the fly at a lower level and hence may well render it possible to fish a spot which to the other mode of action would be impossible.

Once learnt, the fisherman will prefer the under-handed to any other cast when throwing against a light wind or at right angles to a heavy one. Another manifest advantage of the under-handed cast is that the rod, being kept in a horizontal position, is not so visible to the fish as when waved backwards and forwards in a vertical plane, and nothing is more fatal to success with the shy trout of a south-country chalk stream than the flash of the rod on the water. Another benefit to be derived from this cast is that it lands the fly *cocked*, *i.e.* floating with its wings erect, more frequently than any other style of throwing.

Timing and accurate judgment of the power required are as important with this cast as with any other, and failure to accomplish it may in most instances be imputed to undue speed and excessive force; so that here again the advice to the unsuccessful operator to whisper to himself the maxim, "Slower and less force," may be repeated.

The *steeple cast* is very similar to the ordinary over-handed one, but the hand holding the rod is carried up so that in the extreme backward position the arm is extended straight up in the air, and plenty of time being given behind, the cast is made in the usual manner. This cast is of use for various positions, notably where there are bushes or a high bank behind the fisherman which would obstruct the line with the ordinary cast. It is also to be used where the fly has to be propelled an unusually long distance. If the wind is favourable the position at the finish is the same as with the ordinary over-handed cast, but if the wind is adverse, the rod point is brought down on the water with a downward cut.

Where owing to obstructions on the bank or immediately behind the angler, none of the above methods of throwing are available, a modification of the *switch cast* is required. A switch cast is one with which the fly is propelled from the water and is at no time behind the rod. Obviously with the ordinary switch cast the fly is wet and would sink, and hence—to make a cast under somewhat similar conditions with the floating fly—the fly, having been previously dried, is held in the hand and the rod point is moved in a modified figure of eight. At the forward position the fly is let go and travels to the desired spot on the water. It is a difficult cast and one which personally I never could master. Care must be taken not to bring the rod point in collision with the obstruction behind in the act of casting.

All of these casts should be studied and thoroughly mastered, and it is a distinct advantage to be ambidextrous with the fly rod. There are many places where a right-handed man is practically powerless to cover his fish accurately, and there are other lengths of river where the left-handed angler is also at considerable disadvantage. There are, however, some right-handed men who cannot get the knack of casting with the left hand, and they can, as a rule, get over the difficulty by throwing back-handed with the horizontal cast.

The right hand, in making a back-handed cast, is carried back until it is quite close to the left shoulder, and the cast is made with the knuckles and back of the right hand leading. This style of throwing should be cultivated by every one desirous of becoming an adept, even if he is ambidextrous. It will be found in practice that there are in most streams places, where fish feed, which cannot be fished as well by any other method.

A very short cast is always difficult if, as is almost invariably the case, accuracy is an object. The length of line is not sufficiently heavy to enable the rod to overcome the force of an adverse breeze. Usually the tendency is to put too much power into the cast with the intention of counteracting this, and the result is a splash which often scares the fish. Many anglers when throwing such a line hold the spear between the left thumb and forefinger, and thus correct the excess of force.

Drying the fly is effected by making a number of false casts before placing it on the water, keeping the line working backwards and forwards in the air. Formerly in damp weather, or when an artificial had become sodden, the labour of drying the fly was very heavy, and often detracted seriously from the pleasure of those who had only time to devote occasional days to the sport. Many contrivances

100.—A CONSULTATION.

101. ON THE ITCHEN.

were recommended to obviate this hard work. Thus some kept pieces of blotting-paper in which the fly was pressed to draw off some of the moisture; others dried the fly as well as they could with their handkerchiefs, and one ingenious friend kept a bottle containing the fine seed of the pyrethrum, in which he left the fly for a few moments to absorb the water held among the wings, hackle, &c.

Many years ago the late Mr. Andrews, of Guildford, the eminent pisciculturist, told me in the strictest confidence that some of his friends on the Upper Test had for some years waterproofed their flies with paraffin. At my urgent request he induced his friends to allow him to give the angling fraternity the benefit of this ingenious idea. He communicated it to the *Fishing Gazette*, and I sent an account of it to the *Fiela*, both of which papers published the information without delay.

Ever since then the majority of dry-fly men carry a small bottle of paraffin, with a brush, and give their flies a coating of the fluid before casting. For the first two or three casts the superfluous paraffin is washed off, and leaves an opalescent patch on the water, but I cannot find that rising fish take any notice of this unnatural phenomenon. It is the fashion with tackle-makers to persuade their customers to use what is called "odourless paraffin." I do not know what it is, but am quite clear that it is neither as pleasant nor as efficacious in use as the ordinary paraffin used for lighting purposes.

For some years I have adopted the plan of soak-ing all my new artificial flies with paraffin before putting them away in boxes or other receptacles. I leave them for about twenty-four hours spread out on blotting-paper, and find that, as a general rule, a fly treated in this way is waterproofed for life.

102.—ITCHEN TROUT.

103 WHAT FLY IS ON THE WATER?

CHAPTER XXI

FISHING WITH THE FLOATING FLY: FISHING THE FLY

By Frederic M. Halford

There is a diversity of opinion as to the method of fishing the sunk fly. According to one school, when a wet-fly fisherman has cast his fly or flies—whether up the stream, down the stream, or across the stream—his next action generally is to raise his rod and lower it alternately, so as to *work* the fly while it is travelling over the space he is desirous of fishing. This working of the fly causes the fibres of the hackle and wings to close and open, and this motion is believed to impart to the artificial fly a resemblance of life, which tempts a fish on the look-out for food. The adherents of the other school do not believe that working the fly has any beneficial result, and hence allow their flies to be carried down by the current without any movement of the hand holding the rod.

The object of the dry-fly fisherman, however, is to place the fly floating on the surface of the water, and let it drift down over the place where the fish is rising in precisely the same manner, at the same pace, and following the same course as the natural insect would pursue under the same conditions.

The wet-fly fisherman casts his fly or flies over the part of the stream where he would expect the feeding fish at the particular time of season and day to be located. The dry-fly fisherman waits until he sees a fish either rising at the duns, spinners, &c., or in such a position as to lead him to imagine that it is ready to take such insects if they should float down over its nose. Thus the wet-fly fisherman trusts to his instinct or experience in the selection of the spot, while the dry-fly fisherman relies upon his sight to distinguish the fish feeding on, or ready to feed on, the insects of which his artificial fly is an imitation.

The fish in position, and not positively seen to rise to a fly, may be tempted by an accurate and delicate cast to take the imitation, but in club or subscription waters, which are heavily fished, the chances of success are at best problematical. On streams which are seldom visited by the angler, or where the appearance of the natural insect is a rare occurrence, there may be some hope for the angler thus fishing over a trout or grayling lying near the surface, but even in these cases it is doubtful whether it is not a better policy to find if possible a rising fish before casting.

When a fish is seen to rise the first desideratum is to locate accurately the place where it is lying, and this is called *spotting* the rise. If this should occur close to the bank the best guide is to note some prominent mark on the bank, such as a specially high ridge, a dead bough, or any well-defined object opposite to the place where the rise occurred. In mid-stream it is never easy to spot a rise because the ring or disturbance of the surface is carried down by the current, and unless there is a weed patch or some other fixed object close to the rising place, it is generally spotted inaccurately and almost invariably located below the actual spot. Here, too, it may be noted that wherever possible the angler should select fish rising under the bank in preference to those feeding in the middle of the river.

Disturbance on the surface of the water is the usual outward and visible sign of a feeding fish, but it is not safe to infer that every feeding fish is rising or taking floating duns, spinners, or caddis-flies. It may be *minnowing*, *tailing*, *bulging*, or *smutting.* The indication of a rising or smutting fish is usually a ring or at times even a mere bubble; that of the tailing fish, if the tail itself is not visible, being more of a splash; the minnowing fish is chasing its prey, which are often seen leaping to elude its hungry jaws; a bulging fish is actively employed in ploughing the water in all directions, frequently coming close to if not even breaking the surface.

The tailing fish is busily engaged in searching among the weeds for shrimps, snails, caddis, larvæ of the duns, water wood-lice (*Asellus*), young cray-fish, or other succulent animal food. It is literally standing on its head with tail up and near or above the surface, and occasionally it drops its tail and raises its head probably to assist in swallowing the mass of food in its mouth.

It is, of course, a feeding fish, and may sometimes, especially in water only a few inches in depth, be tempted by a floating fly of such pattern as the Gold-ribbed Hare's Ear, Wickham, or Bumble. The best advice to give to the dry-fly fisherman is to leave it alone and find another taking surface food. If he does cast to it he should time his throw so that the fly lands on the water when the fish's tail is down and head up. When the head is down and the tail on the surface it is not likely to catch sight of the fly floating on the stream.

As has been explained in a previous chapter the nymphs of the Ephemeridæ when effecting the metamorphosis to the subimago or first-winged stage swim up to the surface, and there burst open the outer skin from which the dun or mayfly emerges. The bulging fish is one feeding on these nymphs, and the ploughing of the stream is due to its following these immature Ephemeridæ upwards through the water. Sometimes it catches the active nymph at some depth, at others just below the surface, at others again on the surface, and sometimes the winged insect emerges before it can secure it. In such a case it may take the fly, the cast skin, or drop down and wait for another nymph.

Trout when bulging in a shallow are very prominent, and generally give the fisherman an exaggerated notion of their size. If it is possible to find rising fish the dry-fly man is far more likely to be successful with them, but if none are visible he may devote some time to trying the bulgers. I do not think a sunk fly is much use, but a floating one cast occasionally will sometimes tempt an odd hungry fish. The Gold-ribbed Hare's Ear is the most successful pattern, in fact, it is in appearance a fairly good imitation of a dun just emerged from the nymphal shuck, but not quite clear of it.

It is very difficult to distinguish a smutting from a rising fish—smutting being taken to mean feeding on "curses," smuts, or other little black or dark coloured Diptera. Fish rising, *i.e.* taking duns, spinners, or caddis-flies, make a mark on the surface very similar to that of the smutting fish. In both cases it is a ring or a bubble which gradually spreads outwards, and is carried down stream with the current.

The rising fish is generally lying near the bank or behind a weed patch with its nose close to the surface, and as the insect floats down it slowly raises its head and opening its mouth quietly sucks in the fly. At times it will swim a short distance up stream, and at others will drop slowly down stream to take the floating dun or spinner. A fish does not lie as near to the surface when smutting as when rising, and it is more inclined to wander slowly about in comparatively still water following the tiny Diptera, and making very little disturbance on the surface in the act of feeding on them.

Fish smutting are always feeding freely, and should be carefully cast over, first with such patterns as the Fisherman's Curse, the hackle variety of it, one of the sexes of Black Gnat, the Claret Smut, or the Red or Black Ant. If these patterns are not successful, the Wickham, Red Quill, Detached Badger, Silver Sedge on a 00 hook, Furnace or Orange Bumble, or sometimes one of the Red or Orange Tags may be tried.

Above all it is important to remember that smutting fish are very prone to catch sight of the fisherman, and hence be scared owing to their continual movement in the water, so that a few accurate and light casts are to be preferred to anything like flogging. Spinners, which are almost invisible from their wings being laid flat on the water, are often taken by rising fish as well during the day as the evening rise, and it is difficult to distinguish these from smutting fish.

A vast amount of time can be profitably and agreeably spent by the dry-fly fisherman in examining and studying the peculiarities of fish feeding in these various ways, and on these various forms of insects, Mollusks and Crustaceans. Some crude ideas can be gathered from casual working with the naked eye, but the fisherman who is truly desirous of acquiring intimate knowledge of the fishes' nature and their modes of feeding must pursue this branch of the subject with the aid of a field-glass.

An ordinary binocular will serve at the early stages, but if once the student has looked at the stream through one of the prism field-glasses it is safe to predict that he will never use any other kind. The improvement in clearness of outline and general stereoscopic effect is so marked that the best of the old achromatic binoculars are left hopelessly in the background. There are several makers of these prism glasses, some English and others German, but the productions of the house of Zeiss of Jena are to my mind the very best. For the dry-fly fisherman, I think the power with a magnification of six diameters is to be preferred.

Rising fish will at times wander up or down stream a few yards or even in some cases work up for a considerable distance, showing at intervals on the surface when taking a fly, and perhaps dropping down again to the lowest limit of their beat, and then repeating the performance *da capo*. Much time is wasted over fish behaving in this way, and probably the best advice is to leave them altogether, or (if no other feeding trout can be seen) to wait until they are in position, and keep on taking in or about the same spot.

A jumping trout is, as a rule, not a feeding fish, but it has occurred to most anglers to rise and kill one of these jumpers as an exception. It is said that the object of jumping is to fall on the water with a shock sufficient to kill or at least shake off parasitic Entomostraca which cling to and inflame the skin of the Salmonidæ.

The better an angler is able to estimate the size of a fish from its rise the greater will be his chances of success. In reference to this question it must be remembered that the sound of the rise of a heavy fish is lower in the scale of harmony than that of a small one. In swift water the sound is greater in volume than in slow or stagnant parts. A splashing rise is never a promising one, not even at or after dusk when fish are said to splash at the sedge or other caddis-flies. A quiet, slow rise is usually a sign of a large fish feeding well, while a quick dashing one is made in the majority of cases by a little four-ounce trout rising at a passing fly. A trout or grayling coming rapidly to the surface, seizing a fly and going down again like a flash has generally caught sight of the fisherman or is a very shy fish.

It is not necessary to devote much space to the consideration of the most likely patterns for trout or grayling rising steadily and taking the natural insect. A careful scrutiny of the position with the field-glass will generally discover what genera and species of insects are present, and which of these are preferred by the feeding fish. Out of the thirty-six patterns given in Chapter XVIII. no less than thirty-three are imitations or presumably imitations of natural insects, and under all conditions the first patterns to try are those counterfeiting the living fly or flies on the stream. If none of these are successful one or more of the fancy patterns may be tried and are occasionally successful.

The chief object of the dry-fly fisherman is, as previously stated, to manipulate his cast so that the fly drifts down over the rising fish at the same pace and in the same direction as a natural dun or spinner would pursue under the same conditions. When the artificial is in any way departing from the speed or course which would be followed by the natural it is said to *drag*. A dragging fly will always leave more or less of a wake on the surface, and it may be safely predicted will not tempt one of the well-educated trout or grayling of the south-country chalk stream.

No apology is needed for devoting some considerable space to the question of drag and the means of preventing it or at least retarding it until the fly has travelled down well below the rising fish. The more one studies the question and the greater one's practical experience of fishing with floating flies in Hampshire or other dry-fly streams the more fully one is convinced that this is in effect the *crux* of the whole art of fishing the floating fly.

There are three ways in which the angler's fly can drag: firstly, by its travelling more rapidly than the natural; secondly, by its travelling more slowly than the natural; and thirdly, by its drifting across the current. The living insects will drift at the speed of the stream, and will follow its natural course. A very strong wind across, up, or down the stream will at times cause the natural insects to drag, and as a general rule a rising fish will not take the living fly when travelling in this abnormal fashion.

The fisherman's fly drifts at a greater speed than the natural insect when he is throwing across or partly across and up the stream to a place where the current is slower than on that part of the river intervening between him and the rising fish. This form of drag is caused by the strength of the greater stream acting on the reel line, and thus pulling the fly down at a speed in excess of that of the run where the fish is located. It will also tend to drag the fly across the stream and the straighter the line the more will be the effect of both these forms of drag.

It may here be remarked, that the admiration often expressed by an onlooker for the fly fisherman who is casting a beautifully straight line is entirely misplaced when he is fishing the floating fly. The slacker the line is within ordinary limits the better the cast and greater the chance of tempting a shy fish like a Hampshire trout or grayling.

The best method to adopt for preventing or retarding drag owing to the fly floating down too quickly under these conditions, is to make the cast so that while the fly and gut near it are lying straight on the surface, the reel line is delivered in a curve the convex side of which is inclining up stream. The tendency of the stream then is to press on the convex side of this curve and straighten it, and the fly will not drag until this curve has disappeared, or if all has been accurately calculated, until it is past the fish.

To effect this cast with ease, a slight or moderate down-stream wind is required, and an under-handed cast is made either right-handed, left-handed, or back-handed, with either hand. The power put into the cast is insufficient to force it against the wind and just enough to cheat it, and thus deliver the line with an up-stream convexity.

With an up-stream wind the fisherman must deliver the fly as if he desired to place it below the fish, and turning his hand over in the act of casting, make a modified downward cut with plenty of check so as to leave a belly or slack in the reel line between himself and the gut collar. An obstruction on the bank or behind the fisherman may necessitate an over-handed or steeple cast.

In every case the dry-fly fisherman must drop the hand holding the rod at the moment the fly lands on the water. This is most important, as the natural tendency is always to raise the hand, which pulls the line and thus causes the fly to drag.

The artificial fly travels more slowly than the natural wherever the upper part of the gut collar or

103 GETTING INTO POSITION.

if the fish does not regard this and rises at the artificial, it is very difficult to time the strike so as to drive the hook home at the right moment and with the right amount of force. It may be laid down as an axiom that it is hardly worth while trying a second drift over a rising fish on a club or other water which is heavily fished.

The most rapid portions of a stream are seldom good places to select, because they are never easy to fish, and also because the large trout are not usually found rising in such water. Large fish have a knack of choosing their feeding-places in comparatively slack water, into which every floating insect is carried by the action of the stream, being indisposed to have to take any great exertion to secure their food. Trout in deep black pools and eddies are seldom good risers, but the largest grayling are often found and killed in such positions.

All places in which the fly is likely to drag should be avoided, and it is also perhaps as well to eschew the parts of the river which have a great reputation for holding fish when on a club or subscription water, as such spots are generally over-fished by the members and their friends.

The class of water to select is that in which there are plenty of rising fish, to which the floating duns and spinners are carried by the trend of the current, and in which the artificial fly fishes without drag. Unfortunately, places fulfilling this ideal are not often found in a stream, and when they are found our hopes are too often disappointed. Our brother-anglers are prone to follow the same rule, and decide to avoid the difficult and only fish the easy ones; and hence when we settle down to the rising fish we too often find them shy, or even unapproachable, from having been frequently cast over, frequently scared, and often frequently pricked.

It is a good plan, when on water which is much fished, to let other anglers keep on the windward bank, and select the leeward bank yourself. Of course, you have to cast into or across the wind, and to devote your attention to fish rising under your own bank. From the other bank the fly is almost certain to drag more or less, and, as before pointed out, there is no insuperable difficulty in throwing against the wind.

In fresh or rough weather there are generally smooth patches under each bank styled *glass edges*, that on the windward side is protected by the height of the bank from the force of the wind, and that on the lee side is caused by a back-eddy of wind from the lee bank counteracting the force of the true wind. Both of these glass edges generally hold rising fish, which are to be tempted by a careful cast.

It is barely possible to devote too much attention to the work of stalking or approaching a rising fish. With the view of impressing on the reader the importance of this point, I induced an old friend and past-master to pose for the accompanying Plate 100, showing the correct method of *stalking a trout*.

Keep well down, out of sight, and crawl on all-fours to the most favourable spot from which the fish can be covered with a reasonably short throw. Keep down, cast under-handed, so as not to give the fish a chance of seeing the fisherman or the movement of the rod. If you have decided to abandon this particular fish, crawl back and do not scare it. You may thus be able to return to it later on, or some other fisherman coming after you may have a chance of scoring.

Above all, be most particular in judging your distance and making your first cast a correct one, so that the fly may fall lightly on the water and drift down over the fish without semblance of drag. A first-rate dry-fly fisherman rises, hooks, and often lands his fish before it has the smallest suspicion of being cast over. Do not throw too frequently, and for choice do not place your fly in front of a fish just after it has risen at a natural insect. Sometimes a very shy fish in hot, calm weather and a still part of the stream can be deluded by a fly placed on the surface close to the fish at the very moment it is rising at a natural insect, but this is an exception to the general rule laid down in the last sentence.

Many of the younger school of anglers are nervous of casting over a place where the line has to be laid on the grass from the fear of getting hung up when raising the rod to recover. If this recovery is made without jerk it is almost impossible to get caught up. If the fly should by chance get hooked up, take the line in your hand, draw gently without the slightest jerk, and it will generally come clear. If not, and it is in a place where the fly cannot be reached, draw the line slowly through the rings with the rod in a horizontal position. If this does not clear it, go on drawing until you break, and in all probability you will only lose the fly and possibly one or two strands of gut.

Direction of wind and generally the state of the weather were deemed by the old school of angling writers far too important. All that has been written about north and east winds being unfavourable and south or west favourable, of sunshine being fatal to the fisherman and rain fatal to the fish, has long since been proved to be fiction as far as the dry fly is concerned. Given a stock of fish and a hatch of fly, and the sport may be good. The lessees of fisheries can regulate the stock, and to a large extent the fly as well.

The stock of fish in the stream must be continually replenished by turning in yearlings, two-year-olds, or larger trout, and in some cases eyed ova or fry can be kept in tributary streams properly fenced in until they are large enough to take care of themselves in the river. All thinking men among fishery proprietors and lessees have long since realised that the natural reproduction of the stream is no longer adequate to cope with the skill of the modern fishermen and the assiduity with which they pursue their favourite sport, The presence of pike and other predatory or coarse fish is ever prejudicial to the Salmonidæ in the river, and they must be kept down by all possible means. Pike should be wired, trimmered, and war generally waged on them in every available way. At least once a year a thorough netting of the fishery and wholesale destruction of pike, perch, chub, roach, dace, &c., should be efficiently carried out, and the sport generally is likely to be improved if all over-grown, lanky, black male trout taken in the nets are also destroyed. The details of the work of netting a trout stream would take too much space for anything like exhaustive treatment here, and the reader is referred to a little book of mine, entitled, "Making a Fishery," for this information.

The abundance or scarcity of those insects which serve as food for the trout and grayling, such as the Ephemeridæ, Trichoptera, &c., is largely dependent on the sense displayed in weed-cutting. It must be remembered that the larvæ of most of the genera and species of these insects pass their lives in these weeds, and derive their sustenance from the vegetable growth itself or from small living creatures inhabiting the weeds. Thus plenty of weeds means plenty of fly, and a general shaving of the river means a dearth of the larvæ of water-bred insects.

In considering this question of weed-cutting it must be remembered that, during portions of the day, trout are prone to lie hidden in the thickest tangle of the vegetation, and especially in hot weather this shade and protection are essential to their well-being. Thus heavy weed-beds are as desirable for the fish as for the larvæ of the insects.

If the river bed has been entirely denuded of vegetation, the fish, when scared, either by the presence of the fishermen or by the sharp pang of the hook when rising at the artificial fly, will flee in terror, and in their headlong flight communicate the panic to the other fish in the same reach of the stream. If, on the other hand, there are plenty of weeds the frightened trout will conceal itself in the nearest patch of weeds. Hence this again is a reason for leaving plenty of cover in the stream.

A hooked trout will almost infallibly plunge into a neighbouring weed-bed, and very possibly effect its escape either by breaking the fine gut or working the barb out of its mouth if it is only lightly hooked. This weed cultivation and weed-cutting must be carried out on a plan which is a compromise. Sufficient vegetation must be left to give some shelter, and yet it must not be so dense as to handicap the fisherman's chances too heavily.

The ideal shallow should have clean gravel patches among fairly heavy weed-beds, and this is effected either by cutting and raking out these clear places among the weeds or, better still, by an arrangement of alternate bars of weed and clean gravel. This is generally known as the *bar* system of weed-cutting on a shallow. If the weed bars keep the water back too much and thus tend to flood the meadows unduly, transverse longitudinal channels must be cut at intervals through the weed bars.

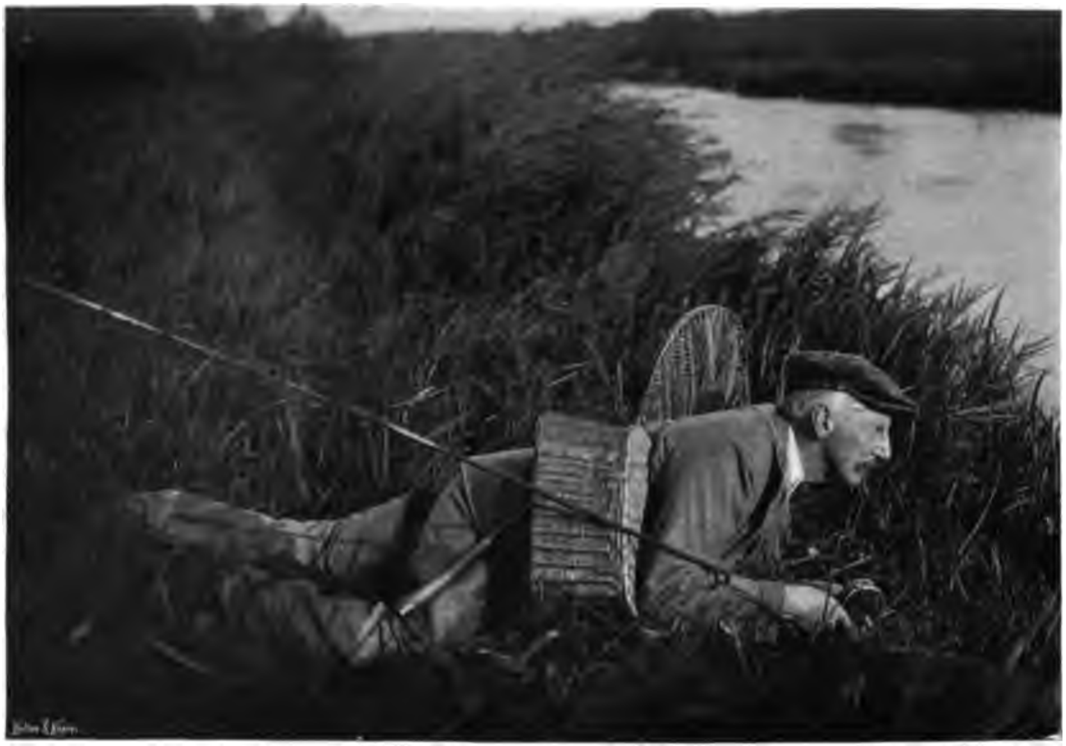
In deep water the best plan is to keep a clean run cut out close to either bank and leave weed patches here and there in the middle of the stream. This is usually styled the *side* system of weed-cutting, and the entire scheme of weed-cutting in the river is described as the *side and bar* system—barring the shallows and siding the deeps.

In designing such a system it is well to cultivate as far as possible the particular weeds which generally harbour the larvæ, and eliminate those which are not favourable to insect life. Water Celery (*Apium inundatum*), Water Crowfoot (*Ranunculus aquatilis*), and Water Starwort (*Callitriche aquatica*) are the weeds which are frequented by the larvæ of the Ephemeridæ and Trichoptera as well as the various snails, fresh-water shrimps, &c., while the American weed (*Elodea canadense*) and the Ribbon weed (*Sparganium ramosum*) are not much affected by these genera. The water-bred larvæ and pupæ of the curses and smuts are generally found in great numbers on the long waving Ribbon weed.

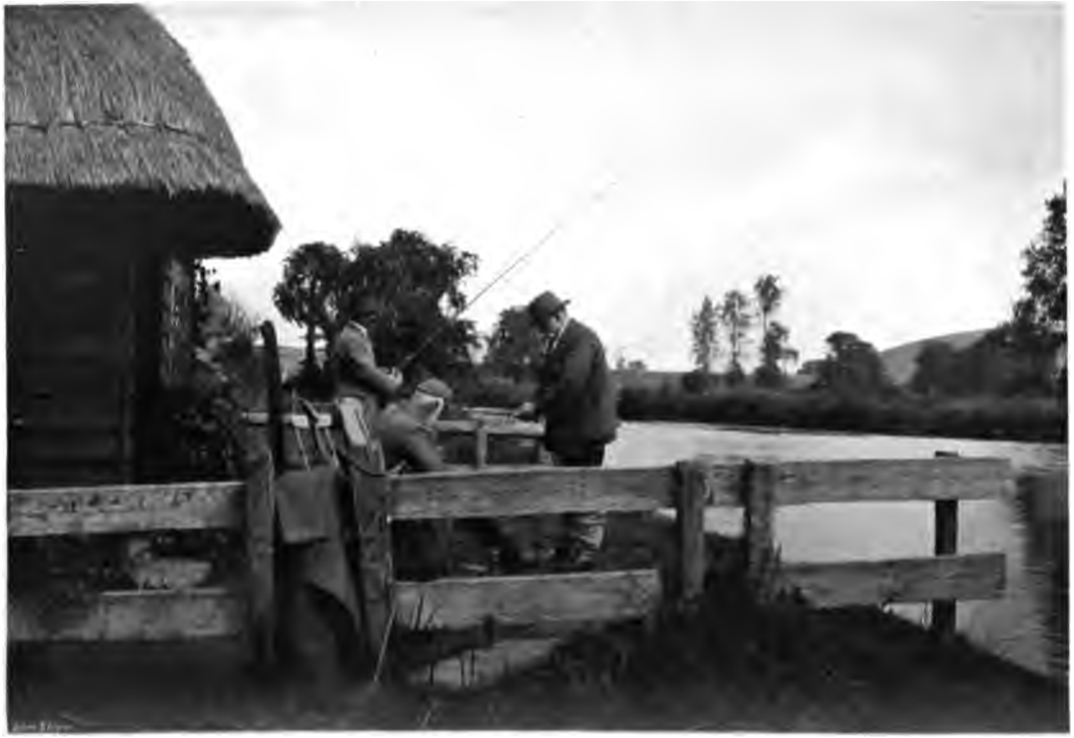
Temperature has very little to do with the hatch of the duns on a particular day, as most of the largest hatches take place in cold weather with northerly or north-easterly winds. Some of the most extraordinary appearances of olive duns and iron-blue duns have been seen in the spring on bitterly cold mornings at 10 A.M. or even earlier, and on fine warm afternoons in April and May the same flies often do not show up before 4 P.M. During thundery weather great bags have been killed and many blank days recorded by the same fishermen on the same reaches of the same chalk streams.

What the Scotch ghillie calls a *bad light* is generally indicative of poor sport. On these days the entire landscape seems to be of a sombre hue, the sky a dull grey, the water without sparkle, and every object in the river clearly defined and visible from a great distance. The air seems oppressive, one's temper is easily ruffled, one's limbs feel stiff, and one's head aches. There is little or no fly, and what there is is generally neglected by the fish, which seem fast asleep on the bed of the stream.

One of the most aggravating circumstances in the dry-fly man's varied experiences is the propensity that fish have for *coming short.* Coming short means that a fish apparently rises at and takes the fly freely, and when the angler raises his hand to strike, either there is no resistance, or the fish is just pricked, or it is hooked and held for a short space of time, when the fly comes back and the fish is away. With grayling it is not always a disaster if they do come short, because a grayling will often keep on coming short at a fly until at length it is hooked; but with a trout there is no second



105.—STALKING A TROUT.



102 A FISHING HUT ON THE ITCHEN.

chance, it is effectually scared and makes its way to the shelter of the nearest weed-bed.

Numerous theories are advanced as to the cause of trout coming short. Some are of opinion that it is almost entirely a question of colour, and that the fish only come short to a fly which is not exactly the same shade as the natural insect on which they are feeding. Some consider it is only a phase of extreme shyness, either on a particular day or on streams or portions of streams which are over-fished. Others again believe that when a fish in the act of rising sees in the fly something (not necessarily shade of colour) which rouses its suspicions, it either turns aside, or, if it be too near the artificial to do this, simply closes its mouth and drowns the fly by passing over it. This last theory is to some degree corroborated by the fact that a tiny scale is often found on the point of the hook after pricking or holding for a few moments a hooked trout.

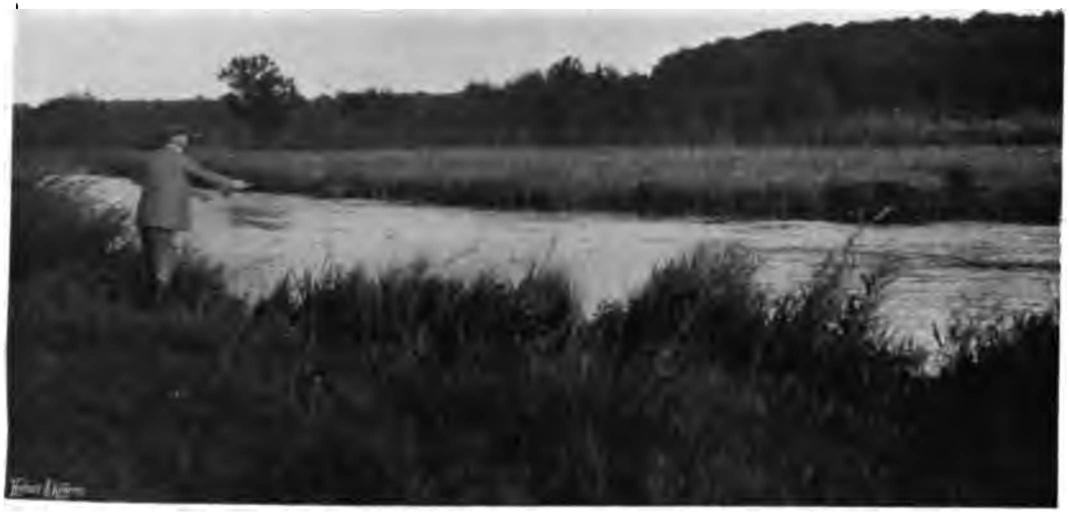
I do not propose devoting much space to the discussion of the desirability of introducing grayling into trout streams. There are arguments to be adduced on both sides. Certainly the presence of grayling lengthens the season, and for those who do not shoot, hunt, or follow other autumn and winter sports, it is an advantage to be able to fish with the floating fly during October, November, December, and possibly even the first two months of the year.

Grayling increase more rapidly than trout, and kill fish that will not look at any pattern of Mayfly or Spent Gnat.

In many streams after the Mayfly, or during the hot weather, there are few flies to be seen on the water during the day, and hence the fish do not feed freely on the floating insect. Just as the sun is commencing to dip under the horizon swarms of spinners, or Ephemeridæ in the imago stage, commence to fall on the water. The fish, which seem to have indulged in a long *siesta* during the heat of the day, at once begin to show signs of activity and rise rapidly all over the surface of the stream.

The fisherman, who has perforce been idle during the long summer day, has now a short time in which to fill his bag or be content with a blank. For patterns he should rely on such flies as the Red Quill, No. 12; Red Spinner, No. 13; Detached Badger, No. 14; or Jenny Spinner, No. 15, and the utmost care and precision is necessary if he would succeed in deluding the wary trout or grayling. There are occasional evenings when the fish are taking nothing but Diptera, such as the Fisherman's Curse, Claret Smut, &c., and unfortunately there are many evenings on which no pattern of fly seems to attract the fish, although they are apparently taking on the surface.

Just at dusk the sedges and other caddis-flies begin to appear, and from then onwards patterns of these, such as the Silver Sedge, Hare's Ear Sedge, Kimbridge Sedge, and Hackle Sedge, dressed on hooks from No. 2 to No. 4, are the best patterns.



108.—THE ITCHEN AT CHILLAND.

109.—IN THE PINK OF CONDITION.

When the light has so far failed that the floating fly is invisible to the fisherman, he should wind up and go home, although long after in the hours of darkness trout can be heard rising and at times killed.

CHAPTER XXII

FISHING WITH THE FLOATING FLY: KILLING THE FISH

By Frederic M. Halford

All previous instructions as to patterns of flies, rod, and tackle, throwing the fly, and fishing the fly have been given with the object of inducing the shy trout or grayling to come to the surface, and take the floating fly. The next point to consider is how to effect a lasting connection between the hook and the fish.

Without entering upon the interminable controversy as to whether striking is necessary or unnecessary, it may be said that some action is required to make sure of hooking the fish. Whether this is in the form of a jerk, or a steady raising of the forearm, or only a slight closing of the fingers on the reel line, is purely a matter of personal equation. We all do something to induce the hook point to penetrate over the barb, and this we will, for the want of a better expression, call *striking*.

Some experts opine that a fish cannot be struck too quickly, and even advocate an action akin to what is called in tennis *half-volleying*. When a rising fish is not hooked, those holding this opinion invariably exclaim, "You were too late!" Others, and I am desirous of being included in this category, are firmly convinced that the fault is, as a rule, that of striking too soon. In any case, large fish rise more slowly than small ones, and hence should not be struck so quickly. With the Mayfly or Spent Gnat it is scarcely possible to be too deliberate.

On one point there is no doubt; whether striking is to be a half-volley or quite slowly applied, the force, while being sufficient to insure the fish being firmly hooked, must not be so violent as to cause a smash of the fine gut at the head of the fly. The best and, in the opinion of many, the only safe method to adopt, is to strike from the reel and keep the forefinger quite clear of the line. As before remarked in the chapter on "The Rod and

Tackle," the check of a reel must be set as lightly as possible with the view of obviating this catastrophe.

When the fish is hooked the rod is at once placed in an erect position, approximately at an angle of sixty degrees with the water. If the fish jumps the rod-point must be momentarily lowered, and restored to the upright position as soon as the hooked fish is back in the water. If there are no weeds in the river the trout or grayling may be allowed to make its run without any great pressure being applied to stop it, and a policy of reeling it in and allowing it to run again, if repeated a few times, will in a short time drown or tire the fish.

Wherever possible keep working the fish down the stream on a short line, and thus take it away from its home to another part of the river where the various obstructions likely to sever the connection are not quite so familiar.

Chalk streams, however, are generally overgrown with heavy weed-beds, and the wary trout is fully alive to the chances in its favour if it can succeed in plunging headlong into the thickest of the vegetation. In some cases the bold policy of holding up the fish's head may succeed, and you may be able to skull-drag it over weeds on top of the water until it is quite exhausted.

If the trout should go to weed, slack at once, and, spearing the rod, take the line between the thumb and forefinger of the right hand, and getting well below the fish gently draw the line backwards and forwards. After a time the fish will thus be induced to leave the weeds, and the rod may be resumed, and the process of playing the fish repeated.

If a fish bolts down stream at a place where you cannot follow it, slack at once, and if the fish does not work back up the stream of its own accord, try the plan of playing it with the line between the thumb and forefinger of the right hand. If it makes a rush, let go the line at once and leave all slack. It is quite surprising how silly even the largest of trout seem to be when played by hand. The very slightest pressure suffices to draw them up or down, and even into the landing-net itself.

All these remedies read as something desperate, but if the fish is firmly hooked they will generally succeed, and if it is insecurely hooked the odds in favour of your losing the fish, under any conditions or with any known treatment, are very great.

Presently, if all holds, the fish will be exhausted and lie on its side at or near the surface of the water. With one hand place the landing net in the water below the fish, and with the other let the hooked fish drop down into it. Draw, but do not lift, the net to the bank. Take the fish out of the net. If it is not sizable, return it gently to the river to grow bigger, and if it is up to the limit give it a smart tap on the summit of the spinal column to put it out of its misery. Weigh it on your spring balance, drop it into your bag or basket, and register all particulars in your pocket-book as a memorandum for entry in your Fishing Diary on your return home.

CHAPTER XXIII

A TYPICAL DAY ON THE TEST

By Martin Smith

To the man who has once developed a love for dry-fly fishing in the clear Hampshire streams, all other fishing is as naught!

He may condescend to salmon fishing when it presents itself, and, if he gets hold of a "big un," will allow that the sport contains both exercise and excitement; but as one of our river-keepers once said to me, when we were discussing the probability of salmon getting up into our water, "Salmon! we wants no salmon, trout's good enough for we; why! any fool can catch a salmon!"

That's about it! All other fishing has in it so much larger an element of chance, and is so much less dependent upon the knowledge, skill, and deftness of hand of the fisher.

The capture of a salmon, however big he may be, cannot be accompanied by that personal sense of triumph and of victory achieved which the dry-fly fisher experiences when he lands a fish which has, perhaps, defied his utmost skill for hours—aye, or for days.

And then the "means to the end" employed are so small — the light, springy 10-foot rod, the finest of gut procurable, and one little fly dressed in humble imitation of, and no larger than, the tiny ephemera which is tempting the trout to the surface.

I remember when I joined the Houghton Fishing Club, nearly forty years ago, our members fished with small salmon rods — huge, double-handed affairs — with strong gut, and flies double and treble the size of those now in use. They wore, by the way, many of them, tall black silk hats; but in spite of the big rods, heavy tackle, and tall black hats, I am bound to acknowledge that they caught fish, and many fish, and big fish; but, unless they mended their ways, they would not do so now!

The trout have moved with the times, an improved system of education has manifestly been at work below the surface of the water, and our fish would now laugh scornfully at the simple devices which in the old days were sufficient to bring them to bank.

That there are wise and foolish trout is, of course, certain; indeed a nephew of mine was telling me, only the other day, of four hours' fishing on a lake in Newfoundland, during which he and a friend killed over 300 trout and 3 salmon. He called that "good sport"! He knows better now, as he has become a dry-fly fisher.

Undoubtedly, the Stockbridge (Test) trout have their full share of this developed intelligence, and it would not surprise me to discover that some of the wary old fish about the town know all the members of the Club by sight, if not by name.

As I have spent some of the very happiest days of my life fishing in the Club waters above and below Stockbridge, I will presume to give a sketch of one of them, and will select a prosperous and successful one, during the mayfly, as that brings in a description of an entirely different art, viz., that of "blowing" with the natural fly.

Stockbridge.—Time, 9 A.M. *Personæ*, nine or ten men, from 35 to 70 years of age, discussing an excellent breakfast.

To them enters "Boots," *i.e.* the junior member of the Club, who has been out for what is called "the early rise."

The more experienced members of the Club have long learnt that the hopes held out by an occasional rise of fly in the early morning are delusive.

The Stockbridge trout are bad breakfast eaters, and the senior members are not foolish enough to offer it to them, but the younger members have to learn! How sad it is that the young will not profit by the experience of their elders! It is, however, I must confess, a joy to see a weary junior come in to a cold breakfast with a tale of disappointed hopes as long as his fishing rod. And do we tell him? What do you think? Then arises the momentous question, "Where will you go?" and in five or six minutes every member has arranged on what particular portion of the water he will make his start. There is, fortunately, plenty of it, both above and below the town, and mutual good-fellowship negatives any possibility of friction on the subject.

The charming *camaraderie* which is characteristic of the Club smooths away all difficulties in this respect—long acquaintance with each other's little weaknesses has begotten a gentle toleration for them. One man likes a certain 200 or 300 yards of water; another will roam up and down the whole four miles or more of fishing that the Club possesses, always hoping that he will find that long sought "rising fish" round the next bend—or the next—or the next; another has a deadly spite against a certain fish that he "knows of," and means to catch if he can. It is, of course, hopeless to extract from him the whereabouts of this fish, and the seniors do not try. Any junior who inquires will be informed that he lies "just below Jones," and much innocent joy is caused if the junior replies in a tone of satisfied interest, "Oh! really."

And now, reader, if you will come with me, I will introduce you to the water and try to show you some sport.

Arrived on our beat, the first thing is to put the rod up; 10-foot split cane, three joints — pretty little thing, is it not? No! this has not a steel centre. Why use a steel centre, when you can get such power without? Just feel the play of the rod —stiff as steel to just above the first joint. The whole secret of "power" in a rod depends upon the point at which the play of the rod is stopped, and, in my humble opinion, that should be two or three inches above the bottom joint; carried three or four inches nearer to the hand the rod loses its power, and is as helpless to lift a long line or to cast it as a man with lumbago to drive a golf ball.

Not get across the river here? Well, this is about the broadest part of our water, and perhaps I could not, although, indeed, two or three of our members would cover it easily; but if you see a fish rising under that far bank, you had much better get over the river by the nearest plank bridge—we have a good many of them—get close up behind him, and fish him with a short line: you would have a far better chance of killing him.

The line we use is, you see, heavy, but with the last few yards tapering to a fine point. The purpose of this heavy line is to enable you to throw against the wind. One necessity of dry-fly fishing is to fish up stream, and as the wind almost invariably blows *down* stream, this casting against the wind is an accomplishment often called into play. No! I cannot tell you *why* the wind generally blows down stream. It is one of Nature's merciless laws, perhaps; anyhow, it is a fact recognised by all dry-fly fishers.

The gut cast, you see, is also heavily tapered, very strong gut at the line end, down to the finest procurable at the point. This is only carrying out the principle I have just mentioned.

No! the heavy gut does not frighten the fish, for he never sees it, or perhaps I should say never *ought* to see it. All that should pass over his head is the fly and the last eighteen inches or two feet of fine gut. Give him a little more, and he will cease rising, or a swirl of the water will tell you that he has business elsewhere.

Whilst I think of it, let me caution you against what is called "drawn" gut. Drawn gut is gut that has been artificially rendered fine and taper by being drawn through small holes in a steel plate. The extra fineness is obtained by the loss of the outside coat of the gut. It quickly loses its strength in use, and is apt to fail you at a critical moment.

It is hardly worth while putting on a fly until we see what is on the water. They say that trout are colour-blind; but that's all rot—I mean, I think that is a mistake.

George, just look round the next bend and see what is going on!

Yes, George is an excellent fellow, never in a hurry—indeed he often frightens me to death when he is landing a fish, he seems so pernicious slow; but he is very clever at it—no injudicious dashes with the net. He leaves me to get the fish really beaten, and then lifts him quietly out.

It is really a great secret not to be in a hurry; if you show the net to a half-beaten fish, he gives a desperate plunge, and then, bang goes something!

There he was, by Jove!—nearly opposite, right under the bank. Didn't see him? Opposite you! just below that dock—don't look for a big splash, but just the nose of the fish breaking the surface of the water. There he was again! Do you see those two bubbles floating down? When you see unaccountable bubbles always stop and see what caused them. It may be a rat—it may be, as you say, a dace rising; but it is quite as likely to be a big trout.

Lend me your glasses, and we will try and make out what he is taking. There! he took a light-coloured "picked wing." Now, let us see if we cannot find something in the box to suit him.

Oh yes, we use nothing but "eyed" flies now. Flies tied on the gut are things of the past.

This little yellow dun looks very like the thing. Small? I wish it were smaller—it is half as big again as the original. Now a touch of oil and we are ready. We always oil our flies, it prevents them getting sodden with water, and they float much better. We use paraffin, and all superfluous oil is gone in two or three casts.

Our friend, you see, is just opposite, and, properly, we ought to walk a quarter of a mile down the river, cross the plank bridge, and sneak up behind him; but I want you to see that this little 10-foot rod has some power of casting, so we will fish him from this side. I will get a yard or two below him, but the river is very broad, and I must remain nearly opposite to him. You see that big dock below which he rose? I want my fly to pitch there, as close to the bank as possible. You see I get my line out below him, so as to run no risk of scaring him. There! nearly right, not quite close enough to the bank. Lazy brutes! they won't come an inch out of their place—that was over his nose, and he didn't look at it. We will let him see it again directly. It is a mistake to keep on thrashing at him—there he was again. Got him! George!

Steady, George, steady! I will bring him down to that bit of deep water below. Bravo! he's a beauty—2 lbs. good. What, 2½? Capital!—Well, we've made a good beginning! Saw a fish rise round the bend, did you, George? Took a caperer?

H'm-m-! there he was, confound him, right out in the middle. I like them under the bank; they always seem easier to catch.

Well, he has beaten us, I am afraid. Stop! by all that's lucky, here is a puff of wind coming up. We'll try him with the natural fly—the real article.

Have you got any caperer, George? A boxful—good! Now, let's get the blow rod up.

Yes, it is rather "a Weaver's Beam" to look at, eighteen feet or more of bamboo! It is not so heavy as it looks, but it is heavy enough when you have been fishing in a strong wind for two or three hours.

Standing rings? Yes! You must have them standing to let the floss silk run through easily.

The purpose of this rod is to let the floss silk we use on it float out with the wind, and then, by gradually lowering the point, to let the natural fly gently drop on the water just above the nose of the fish. Easy is it? Ye-e-es! easy enough when you know how to do it. Now, George, try the floss silk well. I always use white unstained silk, for I am convinced that although it shows very white to you, lying on the water, it is less visible to the fish who are looking up at it. Many men use stained silk, but I venture to think that it is a mistake.

Two yards of finish gut are ample, and quite a small hook.

Now, the caperers, George. I always use two of them—they are so much easier to see.

Put them alive on the hook? why, of course. Cruel? well, perhaps it is! It is easy, however, to snip off their head with a fine pair of scissors—so! but I warn you that they will not last half as long, and soon get sodden with water, and cease to float.

Now we are ready! watch me getting out the line. You see you cannot throw it out—you coax it out. Run a yard of silk off the reel, and then by gentle upward jerks of the rod persuade the slack line to run through the rings. I do not let out fresh line until all the slack has passed through the top ring.

You see with a nice little breeze like this it passes away very easily.

Now we have enough; never blow with one yard of line more than you want. Luckily we can blow up to this chap, and there is a nice breeze, so we do not want very much line; but if the wind is light, and the weather bright, a very frequent combination, you must never forget that you are waving about in the air a great 18-foot rod, and that all trout have eyes in the backs of their heads.

You keep the point of the rod very steady, and to suit circumstances of place and wind, you can quietly and steadily shift both your own position or that of the rod. You can see the flies, can you not, nearly in a line with the fish? I am quite high enough, because lowering the point is equivalent to giving more line. Now I begin to lower the point steadily and gently. Do you still see the flies about a foot above the water? Now I drop them —see them floating down. Got him!

Seems very easy? oh yes! have a try by all means—but it is not *quite* so easy as it looks.

Do you know why you lost that fish? Broke you! Yes, of course, he broke you, but why?

The line wouldn't run out, I know, but why wouldn't it run out? I will show you.

George, catch hold of the rod—lower—so. Do you see you have got *one* turn of the floss silk round the top ring! Stupid! not a bit of it. When you are blowing you have ever to be on the look-out that your line runs free; if you are not careful there is a continual risk of the line taking a turn round one of the rings. You can always satisfy yourself in a moment by drawing in a few inches of line and letting it go again.

Why wouldn't he take the flies when they floated right over his nose? The answer is simple, because at least a yard of floss silk line preceded the flies. It is with blowing, as with whipping, absolutely essential that the flies should not drop more than a foot or eighteen inches above the fish. It is pretty to see a good blower let his flies on to the water just above the fish, lift them again two feet below him, and drop them again and again just in front of him till he fairly teases him into taking them. The flies are lifted by raising slightly the point of the rod, the wind thus gets under the line and lifts the flies off the water, and the reverse action of slightly lowering the point drops them. The one essential point is that the flies should drop directly above the fish; there is no fear of his not seeing them. I have caught many a fish when the flies have dropped actually below him, and he has turned and rushed at them, but I do not think that a trout sees very well to right or left of him, and flies passing two feet to one side or the other may easily escape his notice—at least such is my experience.

There he was! You have not put him down; have another try at him.

Ah! you have done it this time. He is off for good now. Why? Why, because you let that flaw of wind drag the flies right across his nose. The flies must float naturally down stream without the slightest drag. Your eyes must be ever on your floss silk; if you see it lift quickly to one side or the other you must, by very rapidly raising the point of the rod, lift the flies off the water, otherwise the moving floss silk must drag the flies across the fish, and away he goes. Look at your line now—see how even this gentle steady breeze takes it first to one side then to the other; it is seldom for a moment in one stay. This is another reason why you should drop your flies only just above the fish, for it is clear that the shorter time it is on the water the less chance there is of "dragging."

You cannot always, however, show the fly to the fish as you would wish. Blowing across stream with a long line, for instance. It may be that you can only drop the fly some yards above him, then to avoid dragging let your whole line down on to the water, and so let the flies float down to him and take their chance.

You can dry the floss silk very easily by passing it through your handkerchief.

By the way, whilst I think of it, you must never "strike" a fish when blowing.

You are using a very long stiff rod, your line is always slack when the fish lays hold, and your tackle is fine. If you "strike" with this great leverage something is very apt to go. All you have to do is to raise your point steadily until you meet the fish. You cannot be too slow, you may easily be too quick. You see you are offering the fish his natural food—not an artificial fly which he spits out immediately.

And now for luncheon. We have two brace of fish which will average 2 lbs., and that we call an unusually good morning's sport.

I think we ought to get a rise of mayfly this afternoon; we have seen a few during the morning, enough to raise my hopes. We seldom get anything like a rise of the fly before 3.30 or 4 o'clock. And what we call "a rise" now is from all accounts nothing like what it used to be in the past. They say that in old days you could trace the course of the river by the "haze" of mayflies.

You must not expect too much from the rise even if it comes, for the fly is not fully up, and, so far, we have not had enough to make the fish really keen about them.

On a great part of our water the fly has been during many years nearly extinct. We have done our best to restore it by getting larvæ from Hungerford, &c., and perhaps with some little success.

Even where we have a fair show the trout are, so far, very shy of them, and you will see many a fish make a noisy dash at a fly without venturing to touch it. Their memories must be short, for they seem entirely to have forgotten their feasts of past years! When they do get a taste for them they go on until their stomachs are actually distended.

At the present moment, however, the caperer is a more killing fly to blow with, and you may often get a fish with a little dun, which has refused both caperer and mayfly.

Now, we come out fishing to catch fish, and when I cannot get them with a fly I try minnow. We have, down the course of our water, a certain number of places worth trying with a minnow.

They are generally quite small bits—a few yards of sharp running water, the weirs, and an occasional hatch-hole.

I do not bother with a spinning rod; my little 10-foot cane is quite sufficient. I take off my casting line and substitute a spinning trace lightly leaded, and any of the many excellent tackles to be used with the natural minnow.

George always has a box of dead minnows in his pocket, and in two or three minutes I am ready.

Very few casts are necessary; if he won't have it at first he won't have it at all. I never use an artificial when I can get a natural minnow. They will come to the artificial, but they won't often lay hold. The reason is, I believe, the extraordinary clearness of our water. Look here! look at this glass of Test water, clear as crystal; looks fit to drink, does it not? But I would not advise you to try, for all the Stockbridge sewage is in it!

Two o'clock! just the dullest time of the day. We may as well lie in the shade here another half-hour, and I will tell you of a bit of luck that fell to my lot two years ago, down at Mottisfont, about three miles below here.

A member of our club had some nice fishing there, and very kindly gave me a day during the mayfly. I got two or three nice fish during the morning, and at four o'clock, just as the fly began to come up thick, I saw a good fish move. I put an artificial mayfly over him, but without effect, and, as the weather was bright, it struck me that I was fishing with a somewhat heavy cast, so I took it off and replaced it with the lightest in my box. As I looked up from the job I saw a very heavy fish rise just above me, and as my fly came over him he rolled up and took it.

Whir—r—r! went the reel, and in one tremendous rush he left me with but two or three yards of line. Then once, twice, three times he banged up into the air, and to my mingled agony and delight I realised that I was in for a salmon!

I coaxed him gently down stream, knowing full well that he could do as he liked with me. Slowly we worked our way downwards for about 150 yards, when to my horror I found myself stopped by an impassable spear-bed, and it became at once perfectly clear that the fish must be killed or lost where I stood. The water at the spot, luckily for me, formed a deepish pool, and round and round it he sailed, much at his own sweet will.

Suddenly he approached my bank. I stepped back and took in line as fast as I could, until I had the gut cast within a few inches of the point of the rod, and then he lay still under the bank—under the very spot on which I was standing; the bank went sheer down, and the water was apparently six or seven feet deep. Whilst I was pondering what I should do next, that good George stepped very gently and gingerly forward, peered over the bank, and then, inch by inch, stole his net sideways over the edge; inch by inch he lowered it into the water, and slowly it sank out of sight, lower and yet lower. After about twenty seconds of terrible suspense, during which I was wondering what was going to happen next, there came a tremendous upheaval of the net, and, before I could realise what had happened, there lay my fish on the bank, clean run, bright as silver, and 9¼ lbs. in weight—caught with an artificial mayfly, I say, but George might possibly suggest, caught with a landing-net.

Anyhow it was an extraordinary bit of luck, for a 2-lb. trout who knew his business could easily have smashed that gut cast.

You see there is what they call here "a smartish lot" of fly rising, and yet the trout take no notice of them. There is George holding up his hand. Let us see what he has to tell us.

Blowed at a fly, did he? A good fish! Well, we will blow at him a bit. Fly basket, please. George—a nice basket of flies! Look at that fellow; he must have been in there for a day or two, for he has changed his jacket in the basket, and is now a "grey drake." He may as well have his liberty, as he is of but little use to fish with. One mayfly is ample. We only use two caperers because they are so difficult to see.

There he was, but he did not mean business; he

110.—CONSIDERING THE STATE OF THE WATER.

a half above him. Let it float down until it is almost on the spot where the fish rose. Then raise the point sufficiently to lift the fly off the water and let it fly in the air just above his head. You cannot keep it on the water, or it would drag, and then "good-bye." You cannot let it float on down, or the floss silk would in a moment be over the fish.

The fish can see your fly floating about in the air —indeed I have seen them jump at and catch a fly actually in the air.

Then just let the fly touch the water a foot above his nose; let it float for a second or two (*i.e.* six inches); then lift again and drop again.

You see the fly bobbing up and down in the air just above the fish—on the water for a moment, then off again, which gives a fair imitation of the occasional action of the real fly.

It is a poor method of blowing, and the chances of his seeing you and the rod are against you, but it often answers, and is worth trying when the wind is adverse.

You would rather I tried him; perhaps I had better. See how naturally the fly flo-o-o-ats in the air above his head—now just resting on the water, now in the air again; if he does not catch sight of the rod we ought to ——Got him!

Now, did you take note of my manœuvres with that fish? We were a long way above him, with the whole weight of fish and stream against us. It would have been no use attempting to land him from where we were—hold or tackle would have gone; so I ran, as you saw, for all I was worth and got below him. I always use a multiplying reel on my blow-rod for this very purpose. They say they are apt to get out of order, but this is fifty years old and never failed me yet. They are certainly unnecessary on a whipping rod, but invaluable "blowing."

There is the "dressing bell." We dine at six, and they always ring us up at 5.30.

There is our dinner, in that large circular tent on the river bank, with a background of fine old trees. We have three-quarters of a mile to walk, so we will stroll up.

Yes, six o'clock has been selected by the wisdom and experience of our forefathers as the best hour for dinner. The rise of fly is, as a rule, over for the day, the little summer wind you may have had is getting lighter and lighter, the sun is getting low enough to throw a sheen over the water, and for the next hour and a half or two hours the trout generally have the best of us.

Did you see that fish, just above us, close under this bank—not six inches from it? Really he could not have given us a better chance. Whipping rod, of course! There is not a breath of wind for blowing. Try him first with that small mayfly you have on.

Work up to him with your right leg in the water and your left knee on the bank. Keep as low as you can. That will do. You are not twelve yards from him. Now, remember! not more than eighteen inches of gut over his nose. Be careful with your cast, he will not stand many. Good! beautiful! Dash him, he never looked at it. Show it him once more, and then we will try him with a small fly. Very good! Got him, by Jove!

You did that well. Not a breath of wind, and the water like burnished gold; but don't make any mistake, it was his own silly fault for choosing such a place to rise in—close under that high bank; he gave himself away! Now we must get on.

Well, I hope you have had a decent dinner. Hot and good, eh! They bring it down half-cooked and finish it in the kitchen tent under the trees. The wind has quite died away; it is warm and the sky clear. It really looks as if we should have some good evening fishing. A perfectly still, clear, warm night brings out moths and other big flies, and brings up the fish after them. I have settled that we should fish above the town. We will drive up; the trap is ready; so, if you are, let's be off.

Nothing moving! So much the better; for, in the first place, when they rise freely before dark, they are very apt to shut up altogether as night comes on; and, secondly, there is no time in the day when the fish are so shy and so easily put down as just before sunset. Indeed, our forefathers never even fished until after the sun was below the horizon. On a dark evening, when the wind keeps up, you may be lucky enough to get a fish or perhaps a brace before dark—you will get nothing after; but on a lovely, calm, warm evening like this, I think you will lose nothing by waiting till the strong light is out of the sky. Then comes our turn.

Put on a stronger cast of gut; it is no use fishing fine in the twilight.

Ha ! George is hailing us.

Nearly in the middle, was he ?

"Walloped up," did he? Then he probably took something large. We will try him with this small brown moth.

Keep below him. You underestimate a Test trout's powers of vision. You've got him.

I like deep quiet water for night work; that is why I brought you up here.

There was a fish rose; there he was again, and another above him, and there is a third. Bless us! there are half-a-dozen of them at work and rising like mad things.

I will tell you what it is. It is a rise of small fly. It does not happen often, but they do come up at times after dark. Quick, let us change your fly; put on this little grey quill.

Won't see it, won't they ? Just you try them.

There, it is all over now. Three fine grayling in less than a quarter of an hour, and one well on 3 lbs. In all the years I have fished here, I have only once had a similar experience.

Now we will put on a big brown moth again and walk homewards. I do not care much for actual night work.

There was a fish, and a big one from the splash he made. You need not trouble to get below him;

fish down on him, and if he does not come, drag the fly right across his nose. There! he came at it like a dog at a rat. Three pounds if he is an ounce, and showed no more sport than a dace!

Oh, come along, old chap; this isn't sport, it is just murder.

Anyhow, the fun is over. Look at that grey mist rising on the water; it too often follows a bright hot day. When you see that, you may go home.

Ten minutes' walk, and then tea and slippers!

112.—A CATCHY PLACE.

CHAPTER XXIV

FISHING WITH THE WET FLY

By THE EDITOR

I AM truly grateful to Mr. Halford that he has left me, comparatively speaking, so little to say, and that little of relatively small importance, about the fishing of the wet fly. For though I am an ardent champion of the wet fly against all those who avow themselves

112—A CATCHY PL

CHAPTER XXIV

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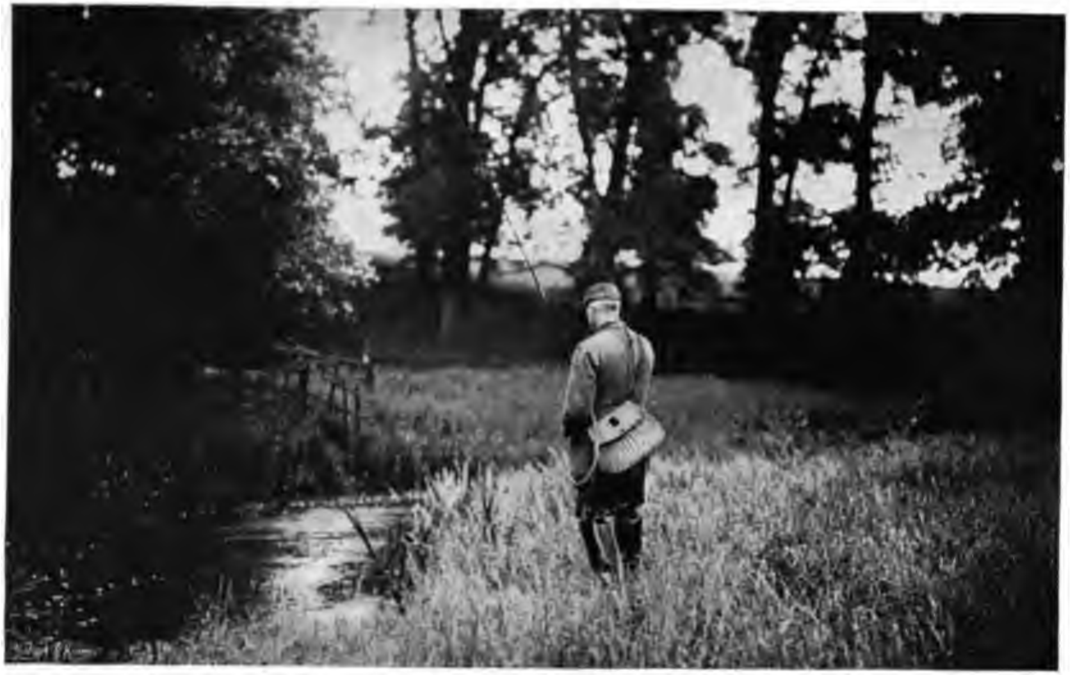
amateurs of the dry fly and of no other form of fishing, refusing to recognise the delights of the brawling stream, the wild scenery, the unexpected rush of the trout, and his numbers in the creel so superior to those of the best day that you are likely to have on a hard-fished dry-fly water, still I am not so prejudiced as to deny that the greater art is the possession of the dry-fly people, that their science includes, embraces, and overlaps that of the "chuck and chance it" school, even as the greater includes the less, as the whole includes the part. Mr. Halford has given instructions as to the casting of the fly that are of the most elaborate detail, and for me to attempt to say anything on that head, following Mr. Halford, would be as "wisdom while you wait," after the *Encyclopædia Britannica.* It would be mere farce. And all that Mr. Halford says with reference to the casting of the dry fly will be of use to him who uses the wet fly only. A man will put some fish into his creel on a wet-fly river without knowing anything like all about casting that Mr. Halford's chapter teaches him. The last refinements are very much less necessary on the wet-fly river than on the dry, but, for all that, the man who has all these subtleties at command will come home, even on the wet-fly stream, with a heavier creel than the man who has them not. And, moreover, there is this to be said, which anglers are beginning to recognise more and more, that the division which we have made in the past of rivers into dry fly and wet fly, with a hard-and-fast line between them, really is very illusory.

There are, to be sure, rivers where the wet fly will hardly take a fish, or very seldom; but there are no rivers where the dry fly will not take a fish; in places there are always some still pools and reaches where there is a chance of a fish, and a good fish, taking a well-cocked fly floating down on top of the water, and where there is no chance, or very little, of a fish taking a wet fly. Realisation of this fact means an increase not only of your chances of catching fish, but also of your general enjoyment of the day and the sport, by its introduction of a new element of variety. With the dry fly you may hopefully fish places that you would not think, and rightly would not think, of fishing at all with the wet fly, so your area of fishable water is much increased, and you have practically no stretches which you pass by without casting a fly at all.

One of the most important departments of this subject, which Mr. Halford's chapters leave virtually untouched, is the question of the most likely places in a river for the taking fish to be lying. Perhaps the most general observation to be made under this head is that feeding fish in a wet-fly river are very apt to be found in any nicely rippling shallow. All such places are well worth careful casting over. But, before going further, it is as well to say that the writer has to confess himself a faithful disciple of the school of that eminently " practical angler " and author of the treatise so named, Mr. Stewart, of which the chief tenet is, without doubt, that you should fish up-stream and not down. Many writers will tell you that whether you fish up-stream or down should be determined by the wind, but, as a matter of fact, and as Mr. Halford's chapter shows, a man should be able to make himself fairly independent of the wind in casting, unless it be very strong indeed, or unless the bank or the trees cramp his chances of throwing. Now and again, under circumstances such as these, one does come across a fish rising in a place where it is only possible to get the fly to him by letting it float down stream, but the occasions are very rare. When the wind is so strong down-stream that up-stream throwing becomes impracticable, it is almost better to seek out such sheltered places and corners as one can generally find beneath the comparatively high banks, only too often thickly fringed with trees, that are more frequent on the fast, wet-fly streams than on the more placid rivers where the dry fly is used. By searching these out carefully with a well-thrown fly the angler is likely to do more towards the filling of his creel than he would by throwing at large over the wind-swept river.

The advantages of the up-stream throwing are almost too obvious to need pointing out, but since there are still many who advocate the down-stream drifting of the fly it is as well just to touch on them. In the first place, the fish are not nearly so liable to see you, since they lie with their heads up-stream, when you are below as when you are above them. There was an old fishing adage of the Houghton Club that said "Remember that the coarsest fishing when the fish do not see you, will succeed better



113.—KEEPING BACK FROM THE BANK

III. A DAY'S CATCH IN NEW ZEALAND.

than the finest when they do." Now this is a maxim that is very thoroughly understood and acted on by the dry-fly fisherman; but many a man who will approach a chalk-stream fish in the manner of the serpent, crawling, taking the utmost advantage of every tussock and rush clump that can give a bit of shelter, will march up to a likely stretch on a wet-fly water for all the world as if he expected the trout to be attracted by the appearance of his manly figure on the river's bank. So it is well to bear in mind that the trout of the rapid streams, if not quite so shy, nor in a position to see objects on the bank quite so clearly as the chalk-stream fellow, has, nevertheless, a pair of eyes, is the same species of fish as the other, and has the same most unnatural tendency to swim away in affright when it sees the angler upon the bank. So that it behoves the angler to approach carefully, to keep himself as much hidden as possible, to go with an Agag-like delicacy, not thumping his feet down on the ground, for fish in the water are very sensitive to any vibration of the neighbouring earth, and whenever he has occasion to pass a stretch of the river without fishing it, to pass some way back from the water and come back to the stream again at the point from which he proposes to fish it. The advantage of wading over other ways of approach is that it puts the angler so much lower, and therefore makes him so much less obvious to the fish. Other advantages are obvious, namely, that where the stream is wooded on either bank the wading angler may often have a chance of making good casts where it would be quite impossible to cast from the bank. Of course this walking into the stream occasions a certain amount of disturbance among the population of the water. If you have a brother angler coming after you it would be a cruel thing to go stamping and churning up all the best reaches of the river. It is enough to get into the water so as to make your casts, and then to come out again when you have well tried out all the fishable parts within reach. Where you have all the river to yourself you need not, of course, be so careful in this matter, but in any case it is probably bad policy to scare the fish unnecessarily. It will only make them the more shy another time.

Where the stream is splashing and broken by its own force and volume, it will matter not a great deal if you do add to the tumult of the water by a little splashing on your own account, but when it is a question of fishing a quiet stretch, it is most essential to get into the river without making too much of a wave or splashing, for the fish will detect this readily enough, and even if they do not make off at once for their nearest hiding-places, will cease feeding and watch developments—which is as much as to say that they will not take your fly.

But the advantages of up-stream fishing are not by any means restricted to the advantage that the fish are less likely to perceive you. There is an equally important one in the fact that in this manner the artificial fly is presented to them in a way that makes it much more like the natural insect than it possibly can be when it is sent to the fish at the end of a long line by a down-stream caster. Mr. Halford, in his section, has emphasised and clearly explained the necessity of getting the fly to the fish as if it was floating with the current, not as if it were being dragged by some other force. The necessity is hardly less great with the wet fly than with the dry. No doubt it is not so absolute, because the fish of a wet-fly stream—that is to say, where the water is broken and dancing, and often is of a rich peaty tinge—obviously cannot have nearly as clear a vision of any object in that water as a similar fish must have in a placid and crystal-clear Hampshire stream. But it is all matter of degree, and the more natural you can make the action of your fly, the more likely is the fish to take it for the natural original. Now, in case of a fly going down-stream at the end of a line, it is almost inevitable that it must come across the current in a kind of semicircle, with the angler as the centre and the line as its radius; there will be a certain drag, hurrying it across the stream; it will not appear to the fish floating as the natural insect would float. On the other hand, if the angler be down below the fish, and cast up-stream above him, then the fly is brought down with the stream in a perfectly natural manner, provided the angler takes care that it is not hurried either by his own unguarded action, or by allowing a portion of the line to be swept along by a faster current than that in which the fly is moving. But. as a rule, this is easily guarded against. The fly comes down in its natural way, it comes down into the fish's mouth, and so soon as the line is tightened at all in that action that we all call striking, which some of us indulge in to excess, which others condemn altogether, but which all, practically, more or less, use, then the fly is driven so much the more firmly home into the fish's mouth. And here we find ourselves at once in touch with yet another advantage of the up-stream method of fishing, for, with the down-stream, where the angler is above the fish and the fish is below his fly, the first result of tightening the line must be to pluck the fly away from the fish, so that the chance of hooking him is dubious indeed if the lure has not been taken well and greedily; but in the up-stream plan, where you have the fish between the angler and the hook, it is obvious that any tightening of the line tends to make hook and fish meet, so that a failure in hooking the fish firmly is, comparatively speaking, most improbable.

We left for the moment the question of the parts of a stream most likely to hold feeding-fish, and therefore the most valuable for throwing over, with the general observation that any likely rippling shallow should be searched out well with the fly. Of course the faster the stream bears the fly down towards the angler, the more frequently he will have to cast, and the more fatigue he will undergo. The down-stream method has no doubt the advantage to the lazy man, that it demands far less frequent throwing; but this is a base consideration, unworthy of the keen fisherman, and not to be seriously discussed. Next, after the rippling shallow, the place perhaps where feeding fish are most likely to lie, is the tail of a rapid, where the little torrent spreads itself out somewhat, and becomes less torrential. This is an easy place to deceive the fish, for if the fly be thrown above them into the tumbling water it will not matter if it falls a trifle more weightily than the proverbial thistledown. There is so much turmoil of the water that the fall of even a clumsily thrown fly cannot add to it appreciably. Then the fly is carried down, just like the natural insect, into the less rapid swirl. The trouble in a place like this is chiefly to keep on terms with your fly, so to speak, so as to be able to bring a tight line to bear on the fish as soon as the fly is taken. The right degree and quickness with which you should lift the rod point as the fly comes down towards you, are impossible to express in any general formula that will fit all the infinite changing circumstances of different rivers and different bits of the same river. We must make the heavy demand on the inexperienced angler that he shall use his common-sense, with an appreciation of the fact that he has to be ever ready to tauten his line the instant a fish is hooked; and then, when once the fish is hooked, down-stream with him as swiftly as the circumstances or the fish himself permit, so that, by playing him below, you do not frighten those that are above. Some anglers make a practice of wading out of the water as soon as they have hooked a fish of any respectable size, and play him according to all the rules at great length. The better advice is to basket him as soon as possible, and without getting out of the water at all, for life is short, and shorter still is the period of the fishes' eager rising; therefore all waste of time is to be deprecated. At the first, give the fish as much law as you can afford him; that is to say, let him have his first one or two runs without more check than is necessary to keep him from making up-stream, or into weeds or places where he is likely to break your cast (as a rule, wet-fly streams are not nearly so weed-encumbered as the dry-fly ones). These rushes will exhaust him, and you will bring him to the net the more quickly, because you have waited to press him until he was too tired to threaten much danger of breaking your cast. Your cast should have been well tried beforehand, so that you may know the amount of strain that you can safely put on it. Your landing-net, by the way, should always be attached to you somewhere—say to the strap of your basket—by a string, so that it will not swim away when you let go of it. With the handle held under your armpit, and the butt of the rod stuck into the thigh of your waders, you will find yourself with both hands free for releasing the hook from the fish's mouth, even while you hold him over the net in case of accidents. Then a tap on the back of the head against the handle of the landing-net gives him his *quietus;* he goes into the basket, and

115.—TOO BRIGHT A DAY.

you are ready for another fish. The quicker you can get him into the landing-net the less chance there is of the hook wearing out from its grip in the mouth.

Another very favourite spot for feeding fish is that which is known as the "hang" of the stream. It is a very good expression, for it conveys the idea of the apparently arrested state of the flow of the water just before it breaks down a small rapid. The whole sheet seems to hang on an inclined plane in momentary suspense.

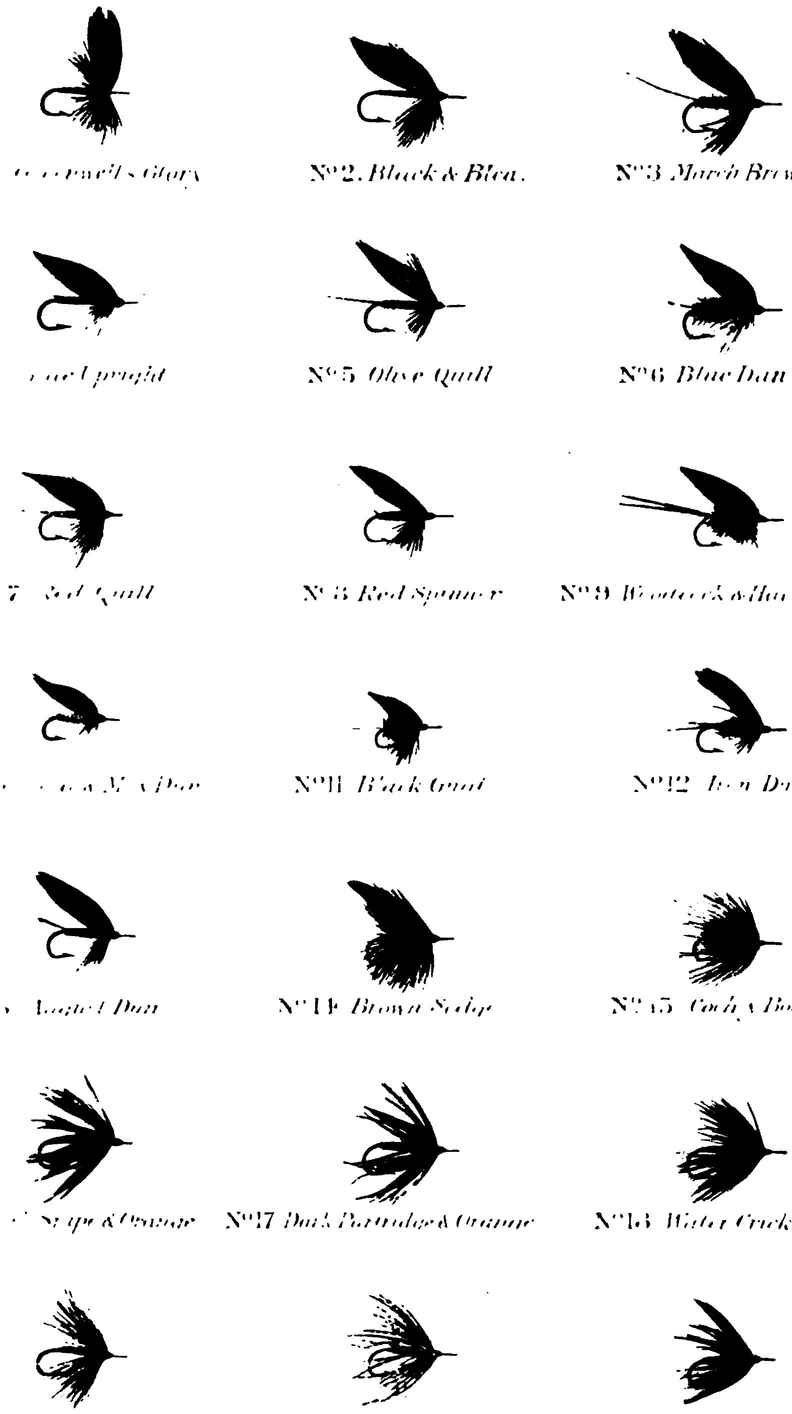
Here you are likely to find many fish. It is a place that has to be fished rather carefully, and the fly thrown rather lightly, because it is a fairly smooth surface of water, so that anything like a splash is very visible. It is a very quickly moving sheet really, in spite of its appearance of arrest, so that the fly is very quickly borne back to you, and you have to make frequent casts.

This perhaps may suffice to indicate, in a very general and sketchy way, the sort of places where you may expect to find fish feeding in battalions, so to speak. There are other places where you are likely to find them sucking down the flies in more or less of solitary grandeur, but in the latter case the fish are perhaps more likely to be big ones. It has been intimated that a still and deep pool is very well worth fishing over with a dry fly, and these are generally in the chief possession of one big fish (or two or three, according to the size of the pool), a fellow who will not trouble to go out into the shallow with the rest to seek his flies. He stays at home and waxes fat on such as good luck sends him, and resents much intrusion on his preserves by other fish. A good fish is often to be found, too, just behind a big stone, where the water comes together again after its division by the obstacle. If this stone is out of water it is as well to drop the fly on the stone and let it fall off into the water, which will present it to the fish in a perfectly natural way. This, too, is the best mode of angling for a fish rising under the far bank from you. Of course you cannot throw on the bank, unless it is simply a grass bank, unencumbered with bushes that would catch up one's fly; but it is very rarely that a really small fly will catch up in grass or any of the ordinary weeds of the bank, so long as it is just pulled through them quietly and without any jerk. Fish often lie under the bank in wait for insects and things blown off the weeds, grass, or bushes, and you should always put your fly along the bank edges on the chance of one of these fish lying in wait. If you are wading, the fishing of either bank is easy, except, of course, in places where bushes overhang it low down, but from the bank the edge under your own side is not easy to fish well. If you have a clear space down-stream to let your line go back, it is best fished with an under-hand cast up-stream, but you do not always find this conveniently clear space behind or to the right of you.

Often and often you will see a fish rising again and again among and under bushes, so that it is virtually impossible to cast a fly to him. Such a fish as this, and he often is a good one, is only to be attacked by the device of "dapping." "Dapping" is an extremely easy mode of fly-fishing, and so easy that it hardly seems sport to some of the ultra-delicate anglers. But the ordinary man (of whom there are many) will not despise it if it puts a good fish or two into his basket. And, after all, if it requires no skill in the cast it requires great care in the stalking of the fish, and getting the rod out over him. "Dapping" means, shortly, letting the fly just touch the water, at the end of a very short vertical line, and keeping it "dapping" up and down on the surface like a fly laying eggs. It does not seem to matter much what fly you use—blue dun, march brown, cow dung—with all the common kinds, you may take fish by "dapping," as probably an admired diversity drop off the bushes from time to time. Since none of your cast need touch the water, you may have it of a good strength; and this you will require, for there will in all likelihood be little chance of playing your fish when you have caught him amongst all these bushes. You must just hang on, let him have line to run out, and reel it in as you can till the fish is tired. If you try any raising of the rod in many of the places where you "dap" you will find yourself in trouble, perhaps with a broken top joint. But we are playing the fish before we have hooked him, which is a cart before the horse mode of business. You want, for this "dapping," a very short line; you want to creep up to the fish and push out the rod through the bushes till its point is over his head, then to lower the fly very gently until it just touches the water. It is almost necessary to have a very short cast, because if it is of any length at all the slightest breeze is nearly sure to put it on a branch of the bushes, and there you are, hung up, with no chance at all of clearing the cast except at the expense of frightening away the fish. So it is always a good plan, if any "dapping" work is at all within prospect, to have a short cast of, say, two feet or so, ready made up, which you can substitute in a minute for your ordinary cast, and fasten to the reel line by any of the many knots or hitches in vogue. It does not do to reel in your ordinary cast past the knot with reel line, because when the fish runs it out it is almost certain that the knot will hitch in the ring, and a smash will follow. Moreover, you require your cast for the "dapping" a deal stouter than your ordinary cast, for reasons above noted.

Obviously the difficulties of this "dapping" are twofold. In the first place, you have to stalk the fish so artfully that you get within the rod's length of him, and yet he does not see you, and then you have to push the rod itself out among the bushes, right over him without his noticing. This you must do very slowly and gradually; but even so he is very apt to perceive you. Sometimes the bushes are so thick that there is no space to push even two feet

TROUT FLIES (WET)



N°1 *Greenwell's Glory*
N°2. *Black & Blea.*
N°3 *March Brown*
N°4 *Red Upright*
N°5 *Olive Quill*
N°6 *Blue Dun*
N°7 *Red Quill*
N°8 *Red Spinner*
N°9 *Woodcock & Hare's Ear*
N°10 *[illegible] Dun*
N°11 *Black Gnat*
N°12 *Iron Dun*
N°13 *[illegible] Dun*
N°14 *Brown Sedge*
N°15 *Coch y Bonddu*
N°16 *Snipe & Orange*
N°17 *Dark Partridge & Orange*
N°18 *Water Cricket*
N°19 *Red Spider*
N°20 *Light Partridge & Yellow*
N°21 *Light Snipe & Yellow*

PLATE 117.

of cast between them without getting hung up. In that case, and indeed in any case, it is a good dodge to have a split bullet or buckshot to pinch on to the gut just six or eight inches above the fly. Then you can push the rod out with only a few inches of the cast beyond the last ring, and when you have the rod point above the fish can let out the line, and the weight of the bullet will pull it through the rings until you have released enough to allow the fly to touch the water. The trouble about this plan is that the weight of the bullet seems to increase the difficulty of letting the fly just play lightly and delicately half in and half off the water. Were it not for this one would always adopt the plan of having a weight on the line when "dapping," for the fish do not seem to see or to notice the weight. Obviously this is a mode of getting the line out which is useful in all kinds of bait-fishing where the bushes are troublesome, and it is as well to notice it here so as to avoid repetition. Worm-fishing in thick water is hardly sport, but it is unquestionably a way of catching fish. Dropping the minnow is also deadly, and may be recommended to those who dislike the cruelty (apparent or real) of worm-fishing. The minnow is allowed to drop, of its own weight, to the bottom of the hole that is being fished, then is drawn up a foot or two, then allowed to drop again, and so on. Such methods are deadly for the catching of the lusty trout, though perhaps they are more proper for those fish that are termed "coarse" rather than "game"; but there are streams so wooded that fly-fishing is impossible, and the methods of the bait-fisher are the only feasible ones. In many of them the device of pushing the rod out through bushes, with a very few inches of line depending, and then releasing the line and letting it be extended by the weight at the end, is a useful one to remember.

Although it is no department of fly-fishing, still, as it is a kind of angling that requires much delicacy and skill, and, moreover, out of a sense of justice, seeing that the fishing of muddy and rain-stained rivers with the worms has been just treated with very small respect, it is only right to say here and now that there is a kind of angling with the worm for trout that is in the truest sense sport. It is commonly and expressively called clear-water worm-fishing; and fish can be taken by its means in a condition of water so low and clear, and with a sky so bright, that no other sporting means could catch them. The angler wades up the stream and casts his worm as lightly as possible, on the finest tackle, into the shallow places where the trout resort on a warm day, and often will take them in a very few inches of water; but every likely spot for a fish to lie in should be carefully searched out by the lure. It is best to put no lead on the cast, and to allow only a few feet of the cast to be in the water, and none of the reel line. Thus the worm will float down with the natural force of the current unimpeded. A like mode of angling is employed with the "creeper," a rather local grub that is the larva of the "stone fly," on those rivers that this fly frequents, and at times it is very deadly. The best worms for the clear-water fishing are the "pink tail" worms, which the fishing-tackle shops will sell, but any available worms of a moderate size—just large enough to cover the hook, or, possibly, two hooks—will serve the purpose. The art lies in the delicate casting of the worm, which should be swung forward underhand and dropped as lightly as possible, and a discreet and not too strong strike given, after allowing the fish to mouth the worm a moment, in a direction opposite to that in which the fish is moving. A long and light rod is the best for this work, as with a short rod a more violent cast is needed to take out the bait, which is thus apt to be broken.

To return to the fly-fishing proper, there are anglers who have a great idea that if a fly is to be fished wet it must be a genuinely wet fly, that is to say, that it must be so sodden that none of the bright little air bubbles may be seen attached to it, which are very visible if we sink a fresh fly of the artificial kind into a tumbler of water. There is an idea that the fish are suspicious of these bubbles and leave the fly alone in consequence. All fear of this may be dispelled by passing the fly for a moment through a wet finger and thumb.

It is likely enough that anything of this bright, gleaming kind may incline the fish to suspicion, and in this connection it may be noted that the glitter of the silvery gut may be readily dulled by rubbing it over with crushed alder leaves, or the juices of other foliage. Alder leaves appear to answer the purpose perhaps better than any other kind.

And now we may come to a part of this great subject that I feel myself all too unworthy to treat, on which there is a good deal of general misapprehension. It is not very uncommon to hear all this style of fly-fishing called indifferently "wet-fly" or "sunk-fly" fishing. There ought to be a very clear distinction drawn between the two kinds. In wet-fly fishing as it is ordinarily understood, that is to say, fishing with the march brown, let us suppose, when the fish are rising freely, it is usual and proper to fish with your fly, although wet, on or very nearly on the surface of the water. It is here that the fish are taking the natural fly, and it is here that they are most likely to take your artificial. But there are times, only too many of them, when the fish are not rising to flies on the surface. At such times it is possible to kill a few by the use of the sunk fly, properly so called, by allowing it to sink, with a slightly slackened line, considerably deeper than you would use it when fish are really rising; and you would not, at such times, kill fish in or near the surface. Grayling fishers are perhaps more familiar with the use of the sunken fly than trout anglers, but the latter may find it pay a good deal more often than a great many of them seem at all disposed to realise. Should the fish, after you have been meeting with more or less success by use of the sunk fly, come on the rise again, as their capricious manner is, it is well to abandon at once the sunk-fly system and again to offer them the lure at or near the surface. If you continue to fish deep for trout feeding on the surface you are fishing beneath them altogether, and the surface fishing is the mode for ordinary and general use; the other is often useful in an emergency when fish are sulky.

As a general rule it is as well to give yourself a double chance by having at least a couple of flies in the cast. As a matter of fact you get more than a double chance by this, because the drop fly works rather differently from the tail fly, sometimes with just that touch and rise again movement on a broken water that is like a natural fly. Unless the water is fine and clear you may quite safely—that is, without fear of the fish being at all scared by the one fly from the other—have three on your cast, with an interval of three feet, say, between each. In case of fine water use two flies, and have an interval of six feet between them. Provided you make the gut attachment from the dropper to the main cast short enough, there is not much fear of entanglement as a consequence of increasing the number of the flies. About two inches and a half is quite length enough from the drop-fly to the cast, and the attachment should be of fairly stout gut, for if the gut is very fine the dropper will not stand out and away from the main cast, and is more likely to become entangled on it. Of course there are many cases, as when you are fishing very difficult places under trees and bushes, and especially when you are trying a floating fly over a still pool, in which you would make a great mistake if you were to use more flies than one, but on a wet-fly stream such cases are the exception.

It is very little use trying to give instructions in written words as to the use of the blowing line. For this work you want a long light rod and a long light floss silk line so that the wind may carry it out easily, and you fish with the natural mayfly, or drake fly by preference, allowing the fly just to alight and float on the surface of the loch or river. It is a style of fishing that demands care and delicacy of handling rather than any science that can be even suggested in a book. It is a style of fishing that is very much in vogue on the Irish lakes, and this brings us to the consideration of the whole subject of loch-fishing in general.

There is a common notion that loch-fishing is a species of fool's angling—that any duffer can catch fish in a loch; and the notion, like others of its kind, is not without some reason. But it is when it is treated as if it were an universally true maxim that it fails. When a good breeze is ruffling the surface of a loch there is no great skill required for the catching of fish, and all men are in a great measure equal, but when the surface is still and mirror-like the very utmost delicacy of throwing sometimes is insufficient to delude the trout, even the natural green drake alighting on the end of the blowing line as softly as thistledown seems an object of suspicion. Then it is that, far from the fishing being easy, the very acme of skill is required if the angler is to fill his basket. It becomes necessary to give some sort of motion to the artificial fly, and this is better done by a series of short sharp jerks than by a continuous movement.

Whatever our individual views may be about the necessity and the time for striking when fishing a stream, it may be taken almost as an axiom that it is far better not to strike at all than to strike too soon in loch-fishing, whether for sea-trout or for fresh-water trout. Naturally, as the ordinary flies that they see floating on the loch are not hurried past them by any current, there is no necessity on their part for quick rising; they rise slowly, and in consequence if the strike be made too soon it only has the effect of plucking the fly away before the fish's mouth has closed upon it.

The lochs may, perchance, contain some specimens of the *ferox*, of which one has been caught between 39 and 40 lbs. in weight, while the average is very heavy, and the fish are very game, but as these more often fall victims to the spinner or the live-baiter, we may leave consideration of the methods for its capture to those who are treating of these departments.

There is also a quaint and large trout (of the identical species really) known as the Thames trout, and living in the Father of Rivers, which is generally to be attracted by the like methods only, and whom, therefore, we must, with apologies, relegate, for a consideration of the methods of its angling, to the "coarse fish" department.

The Fordwich trout, of the Kentish Stour, we need not consider; because, in the first place, he seems to be a salmon, and in the second place no one catches him whatever he be. We have lots without him; our "gillaroo," our Lochlevens, and all the other varieties of our native brown trout. There is also the *fontinalis*, which is a charr, if he has his rights, and best of all, if we can keep him from going to sea, our gallant and greedy and beautiful friend *irideus*, the rainbow.

Spinning the minnow, real or artificial, is so little in vogue for the brown trout, except on the lochs or in the Thames, and the method of spinning is so well discussed elsewhere in these volumes, that it is not necessary to speak of it here. But this chapter ought not, perhaps, to close without some indication to the novice of the kind of wet-flies most suitable for different times of year. It is a list that different anglers would draw up with many differences of opinion; though in general features their lists would resemble each other. The lists of a West Country, a Welsh, and a North Country fisherman would again show local differences. For my own part, I have to confess to being no great believer in a multiplicity of flies for wet-fly angling. With the March Brown alone, of various sizes, I believe a man would do a deal of execution all the season through, and would not be badly beaten by a man of equal skill with a bookful. Add to this, a Blue and Olive Dun, say, and the equipment already is not very far from being adequate for all occasions. But others prefer a variety, and very probably they may be right. There are certain rivers on which certain flies kill that would not kill on others—as the Blue Upright on West Country streams, Coch-y-Bhondhu on Welsh rivers chiefly, Blea and Hare's Ear, and Grannom on some rivers of the North. But by way of giving a fuller indication, let us make the following selection for the various months.

In the West Country you may begin as early as February, perhaps, with the Blue Upright and February Red. These will also serve you in March, with the March Brown, male, female, and spinner, Greenwell's Glory, Black and Blea, Blue Dun, Hare's Ear, Coch-y-Bhondhu, and Red Spinner. For all the earlier months the cow-dung fly may be useful on a gusty day, such as is likely to blow the flies on to the water. It is not of so much use on a comparatively still day. The Blue Dun, with its variety the Iron Blue, continues to be a useful fly through April and into May, and the Coch-y-Bhondhu goes on right into June, especially if the day be rough, or the water at all big or coloured. Then in April comes the Jenny Spinner, Hawthorn Fly, Grannom and Stone Fly. The Red Spinner is still useful, and the Red Spider and Sand Fly. In this month, and also in May and June, the Sedge is a good fly late in the evening when the fish seem to be taking large flies. Later again, as dusk comes, you may try the white-winged Coachman, or even a White Moth.

The Black Gnat, on the other hand, is useful in the fine water and clear weather. The Whirling Dun, Olive Dun, and Pale Watery Dun are all good flies that are useful in May and June. In the latter month in the North Country streams the Black and Blea comes into use with Hofland's Fancy, the so-called Alder Fly, the Brown Palmer, the Drakes, of course, the Water Cricket, Quill Gnats, and Midges. The Red Palmer comes on in July, with the July, Pale Watery, and Iron Duns. In the North, a small Blea and Hare's Ear is good, and the Red Ant may account for a fish anywhere. There is a special so-called August Dun, that may do for August and September, with any of the other small duns, gnats, and so on. Occasionally through the summer of the year a Wickham's Fancy seems a favourite with the fish.

If a man wishes to tie his flies for himself, surely there is no reason in the world why he should not do so, but the trout fly is not an expensive item in the total equipment, and probably the shop-tied ones are generally the better. If they have a fault, however, it is usually without doubt on the side of having too much wing and hackle—speaking of the wet flies, be it understood—and if it be thought a good plan to try the fish with a sunken fly it is often well to cut the wings off altogether. A Palmer fished thus will sometimes take fish when other flies fail.

If it pleases a man to have a multiplicity of flies, the names of those with which he may fill his book is marked legion; but those in the above list are as many as a man can need for the brown trout on the wet-fly streams, though a few of the more fancy varieties, such as Zulus, Teal and Red, and so on, may serve him well on a loch, where even brown trout seem to find an attraction in a bit of tinsel or a gaudy feather.

CHAPTER XXV

ANGLING FOR SEA TROUT

By the Honourable A. E. Gathorne Hardy

General Remarks—Tackle and Equipment

The sea trout, like the brown trout, varies considerably in shape, markings, and appearance, according to locality and surroundings. Some naturalists, and many fishermen, believe in a great many distinct species, but I do not personally think that there is good ground for subdividing the genus. From a fisherman's point of view, at any rate, the question is not very material, as the sewin of Wales, the white trout of Ireland, and all descriptions of *Salmo trutta*, from the small finnock and herling up to the big fellows in Norwegian rivers, give, according

118.—SEA-TROUT OR SALMON IN NORWAY.

119.—A TYPICAL NORWEGIAN POOL.

to their size, the same sport, rise in the same way, and prefer the same sized flies, although the very smallest of them, even when hardly larger than a smolt, will occasionally contrive to hang himself somehow on to the biggest Jock Scott or Butcher ever used in the Tay or Tweed. I have a peculiar affection for these game fish; and regret to have to report that in many of the Scotch rivers, where I have fished during more than thirty years, I have traced a steady diminution of their numbers more marked than that of the much persecuted salmon. Where I used to reckon with certainty on getting a dozen or more on any ordinary day, with occasional heavy baskets when the conditions of sky, wind, and water were exceptionally favourable, I have now generally to content myself with a much more modest measure of success. Over-netting is responsible for a great deal of this decrease; river pollution and deep drainage have also done their part towards it; the weekly close time is not long enough to give the shoals a fair chance of running the gauntlet of their enemies, and many of the smallest fish somehow manage to entangle themselves in nets, the meshes of which are supposed to be sufficiently large to insure their escape. However, there are plenty of places in Great Britain and Ireland where fair sport can still be enjoyed, and great fun it is to have a good day with the sea trout whether early in the year or in the late autumn.

To do justice to these sporting fish it is essential that the rod used should not be too heavy or the tackle too strong. Unfortunately in most rivers they are treated as merely ancillary to the salmon, and have no chance of showing what a gallant fight they could have made if they were not unfairly handicapped by the tackle used against them. Often this cannot be helped ; the angler who is fortunate enough to be enjoying a day's salmon fishing in a big river in good condition cannot be expected to risk the loss of a twenty pounder because there are sea trout as well as salmon in the water, and some of the small fellows are pretty sure to rise to his fly. But it must be confessed that, unless the sea trout run very large or the stream is exceptionally strong, the sport they give on a salmon rod is hardly worthy of the name ; although there is often a moment before you get on terms with them when they sometimes deceive you into supposing you have hooked a salmon. To illustrate my meaning, I remember one August day in 1901, when I was fishing that magnificent river, the Sundal, in Norway. The stream was just running down after the one small spate of that extraordinarily dry season, and I knew that I was sure of a good bag of grilse, with a fair chance of one or two salmon. I was therefore equipped with a strong 16-foot split cane salmon rod, a heavy single gut cast, and good-sized flies. In one pool, called Kingen Pool, I caught upwards of twenty sea trout, averaging about a pound each in weight, in less than half-an-hour. I was wading deep, and the stream was strong ; and at nearly every cast I hooked a fish. My attendant, Ole, remained on the shore with the net and gaff, and it would have wasted a lot of valuable time if I had walked back to him whenever I wanted to land a fish. I therefore treated anything under 1½ lb. in weight in an unceremonious manner; as soon as I had got a good hold of my trout, I drew the line through the rings till it was shorter than the rod, then lifted the fish out of the water, and swung him to the man on the bank, and when he had disengaged the fly, cast again and repeated the process. A few, but not many, broke the hold and escaped, through the rough handling they received; but I was sure of enough, and more than enough, for the pot, and it would have been a waste of time had I gone through the form of elaborately playing every fish. Ole, with all a Norwegian gillie's thirst for blood, was delighted at the number I was catching, and anxious that I should fish the same water over again when I had worked my way down to the bottom of the pool, more than once landing two fish at a time, but it was not my idea of sport, and I left the rest of the shoal in peace, and moved on to heavier water, where there was a better chance of salmon. Had I cared to continue the massacre, I believe I should have had no difficulty in killing a hundred or more in the course of the day, but, as Brutus said of Cæsar—

> "Let's carve him as a dish fit for the gods,
> Not hew him as a carcase fit for hounds."

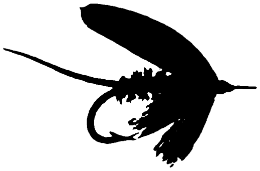
Such a hecatomb of victims would have been butchery, not sport.

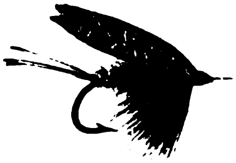
For sea trout fishing proper, I recommend an ordinary single-handed trout rod, 10 feet 6 inches or thereabouts; a trout reel of corresponding size, with 30 yards of fine dressed taper line spliced on to about 100 yards of fine but strong silk, cotton, or hemp backing. For any reel, whether for salmon or trout, I think a good supply of "backing" desirable. The reel winds up the line quicker and better for being fairly full, and the length available for exceptional rushes of big fish gives a feeling of confidence; while it is an unnecessary expense to have much more costly line than it is possible to cast, or than a fish runs out on ordinary occasions. In small rivers, like the Add in Argyllshire, when the banks are clear and it is possible to follow fish everywhere, the stream not being strong or strewn with sunken rocks, I often venture to fish even for salmon with such a rod, when the water is not in heavy flood. By so doing I am able to enjoy my sport with the sea trout, as well as that with grilse and small salmon, and on that class of river, although there are certain runs and pools where you can be sure which sort of fish you are going to rise, there are many places where it is impossible to tell beforehand whether a ½-lb. finnock or a 12-lb. salmon may take your fly. In larger and stronger rivers, where the sea trout and salmon casts are usually more clearly distinguishable, and when it is almost essential to have a man with you to gaff and carry your fish, it is a good plan to have both a small and a large rod, and to use the small one only in comparatively shallow sea trout runs, where you are not likely to hook a salmon. A light bag or basket should be slung over your shoulder, and you should also have a landing-net, either a folding one attached to the strap of the creel, or one with a strong staff, shod with a spike where the wading is deep or dangerous. You are then independent of your gillie, and can land and carry your fish without perpetually coming out of the water in the middle of a run. Of course, when I advise the use of a 10 feet 6 inch split cane rod for sea trout, I am not laying down a hard-and-fast rule. There are places where a larger and stronger rod, probably a double-handed one, is absolutely essential to enable you to cover the casts, or to steer your fish through rocky and difficult places; but I am certain that the best sport is got by using the lightest rods and tackle suited to the stream and locality. Opinions differ as to the advisability of striking when a salmon rises; but I do not think there can be any doubt that hand and eye must act together simultaneously directly a sea trout takes your fly. They rise very quickly and turn equally rapidly, and therefore the advantage resting with an expert fisherman is nowhere more apparent than in the act of striking. You may see two friends fishing similar pools on the same day, when the fish are rising freely, but are inclined to come short. The one somehow manages to secure nearly every trout that rises; the other misses his with equal regularity, or, on the rare occasions when he hooks one, just scrapes the edge of its mouth or jaw, so that with a flutter on the surface of the water or a jump out of it, it generally manages to rid itself of the hook and escape. Your casting line should be of fine but strong natural gut, and again, although you must be guided by the size and strength of the water, my advice is that you should err, if err you must, on the side of fineness. I am quite sure that much of the gut sold under the name of sea trout casts is unnecessarily stout and visible, and that for any ordinary sea trout loch or stream, what tackle makers call a loch trout cast is quite strong enough. On bright and clear days, with low water, I have made good baskets of sea trout with the finest trout casts, although, of course, I should not venture to use or recommend drawn gut. It is surprising what large and strong fish can be landed with fine tackle, if a little patience and judgment are exercised during the process of playing the fish. But remember that the finer your cast, the more need there is that it should be frequently watched and tested during the day. When in perfect condition it will stand a considerable strain; but it gets easily worn, rubbed, or cracked, and after an hour or so of wear, especially if you have caught five or six small but hardy fish, some weak point is likely to develop, and if unnoticed to cause the loss of fish, cast, and flies, and necessitate the painful and humiliating process of "going into dock for repairs." It is particularly annoying to have to sit down and rig out a fresh cast with perhaps three flies; and time and temper are wasted, especially if you happen to be fishing a tidal pool, with the knowledge that there is not long to wait before the sea will come in and flood you out. You are apt to hurry and not soak your gut properly before tying the knots—a fatal piece of neglect—and the wise man is he who always puts together two or more casts ready for use either over night or before starting in the morning.

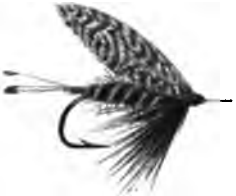
With regard to flies I do not think it would serve any good purpose to supply a long list. Any good tackle maker will exhibit a large selection of standard patterns, and sea trout, when really on the rise, are certainly not very particular, but can be relied upon to come at almost any rather bright and conspicuous fly tied on a moderate-sized hook. I seldom use anything larger than a No. 7 Limerick hook, and I prefer to have my flies tied on double hooks, not only because there is a better chance of hooking and landing fish, but also because I think the fly hangs and shows better in the water.

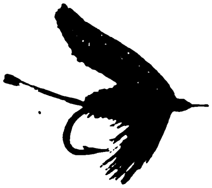
I keep a selection of my favourite patterns, graduated from 7 to 10. If I am compelled, as has occasionally been the case, to fish with something even smaller, in very low and clear water, I have generally resorted to ordinary brown trout flies, of such patterns as Wickham's Fancy, Greenwell Glory, or red or black Palmers. My favourite patterns, with which I have caught sea trout of all sizes in every description of water, are diminutive models of such salmon flies as Jock Scott, Blue, Black, and Silver Doctors; and Alexandras, with a little bit of jungle fowl in the peacock harl wing, and the body made of silver thread, wound rather large, instead of the ordinary tinsel, with a bit of golden pheasant topping for the tail. This is always a most deadly lure, and I have little doubt that fish take it for a minnow or small fish with dark back and silver belly. Another very favourite fly has a blue silk body, wound round with silver twist, with a jay hackle and wing of teal, with a strand or two of golden pheasant and a bit of the inevitable jungle fowl. Other good patterns are red, yellow, or French grey bodies, with plain hackles, red or golden pheasant tags, and teal, starling, or woodcock wings. All these flies in their turn have done great execution, but my own private opinion is that there is hardly any combination of silk tinsel and feathers which would not catch fish when really in a taking humour. If you study the records of almost any river, with an opportunity of seeing the flies with which our ancestors caught their fish, you will find that at different periods of time a particular pattern gained the upper hand, and, after having had its little day, passed into comparative oblivion and neglect. The fly which catches most fish is the one which is most frequently attached to the line, and kept on for the longest period. My own experience leads me to attach much importance to size, and I have certainly succeeded best with small flies; but Dr. Edward Hamilton, a very high authority on any point of fishing or natural history, mentions one loch, Loch Ailt, on the west coast of Scotland, where he found that large flies, such as those used for salmon on the Lochy, were necessary

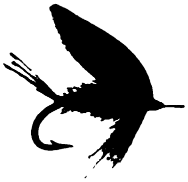
Loch & Sea Trout Flies

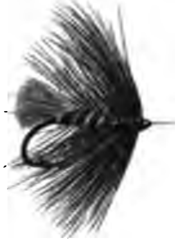

N° 1 *[illegible] Favourite*

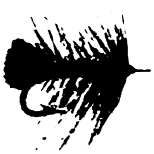

N° 2 *Teal & Yellow*

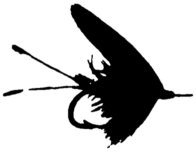

N° 3 *Teal & Black*

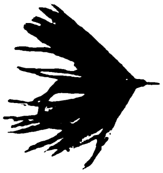

N° 4 *Teal & Claret*

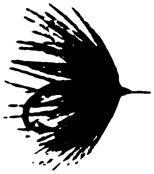

N° 5 *Woodcock & Yellow*

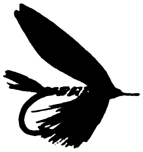

N° 6 *Black Zulu*

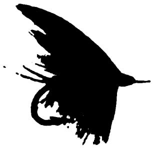

N° 7 *Red Zulu*

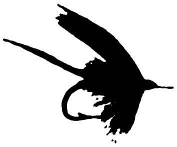

N° 8 *Grouse & Purple*

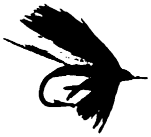

N° 9 *[illegible]*

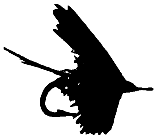

N° 10 *Partridge & Orange*

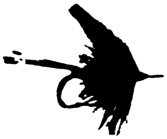

N° 11 *Butcher*

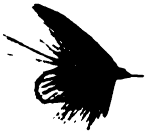

N° 12 *Green [illegible]*


N° 13 *Fiery Brown*


N° 14 *Orange Grouse*


N° 15 *Claret [illegible]*


N° 16 *[illegible]*


N° 17 *[illegible]*

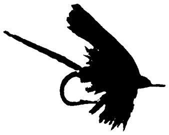

N° 18 *[illegible]*

PLATE 120

for sport. He mentions that the sea trout in that loch were very large, as heavy as 10 lbs., and I have no doubt that he is right, although I have never yet come across water myself where the use of very large flies was advantageous. Local fishermen, as a rule, are very conservative, and will tell you that no flies but those of their own patterns and sizes are any use on the water they are in the habit of fishing; but the angler who sticks to his old favourites, in spite of the hardly concealed contempt with which his boatman inspects the contents of his fly-book, will often have better sport than if he had allowed himself to be guided by the authority of his mentor and the traditions of the locality. My favourite sea trout rods have been a 14-foot three-joint double-handed greenheart rod, by Farlow; a 12-foot split cane trout rod, by the same maker; and last, but not least, except in size, a 10-foot 6-inch split cane rod, by Hardy. It is not my intention to puff any particular maker, and there are many very excellent ones now who turn out work which can be thoroughly relied upon; but the most short-sighted economy is to buy cheap tackle of an inferior type and character. Fishing cannot ever be a cheap sport, and the rod that breaks by the water side, or the reel that sticks or overruns when you are perhaps playing the fish of the season, is the dearest of dear bargains, however small may have been the price originally paid for it. Excellent gut for casting lines can be had at the Army and Navy or Civil Service Stores, and with their large output and sale you are sure not to get stuff that has been long kept in stock. Gut deteriorates with time, and it is not a good thing to lay in a very large supply, or to use any which has been long on your hands.

I have said nothing about minnow or worm fishing, because I never use anything but a fly if I can help it, and also because there is nothing peculiar to sea trout fishing in the methods of using such baits. The same minnows and worms worked in the same way as for ordinary brown trout will catch sea trout under identically the same conditions. At the mouth of small burns running into the sea, good sport can be had with sea trout by using the worm in a spate in pools and runs, where to cast a fly is difficult, if not impossible; and there can be no ground for cavilling at the use of the only method suited to the place and circumstances; but where the fly can be used no other method of fishing seems to me quite legitimate.

CHAPTER XXVI

SOME RECOLLECTIONS OF SEA TROUT FISHING

By the Honourable A. E. Gathorne Hardy

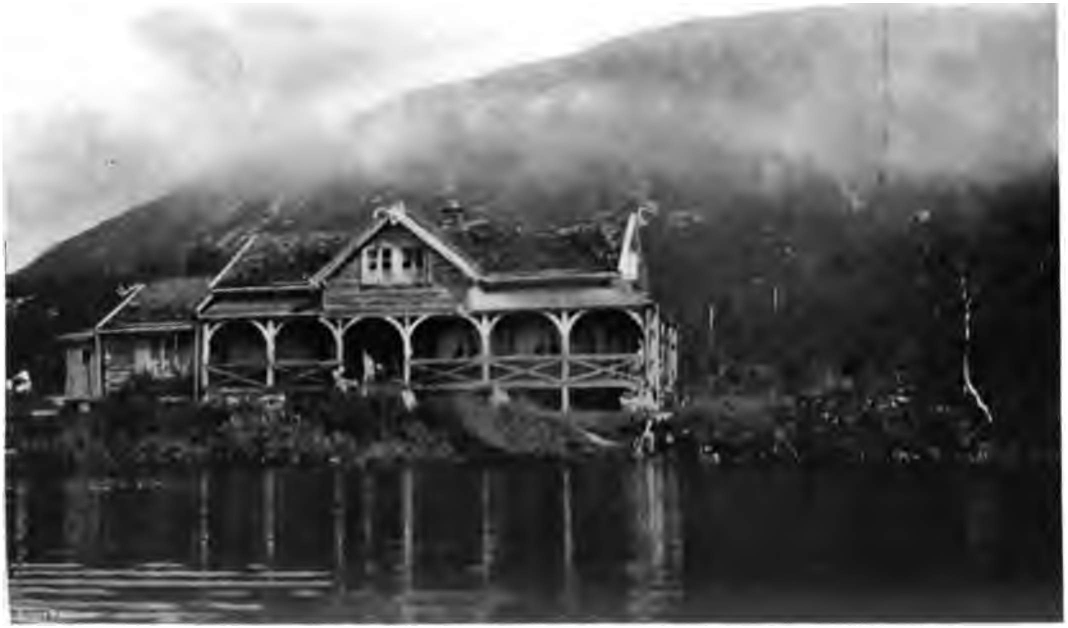
WHAT a shifting panorama of exquisite scenery passes before my mental vision as I recall to memory the various spots I have visited in search of sea trout: streams, rivers, lakes, rocky torrents and still reaches, and even brackish estuaries visited by every tide. Wales, Norway, Ireland, and nearly every part of Scotland have each furnished their quota of delightful sport during some forty years, and it is not always the biggest baskets or even the heaviest fish that crown the days which fill the largest place in my memories of the past.

Wales was certainly the place where I made my first acquaintance with the sea trout—Wales in the 'sixties when I was a lad, man by courtesy only, which I visited on two occasions with reading parties, before the railway had penetrated to any part beyond Llangollen road; and the crowds of tourists and trippers were more reasonable in number, and more select, as they had to be conveyed to their destinations in coaches, posting, or on foot. But even then, those past-masters of the art of poaching, the native Cambrians, had done what they could to ruin the natural advantages of their beautiful rivers, and what should have been a fisherman's paradise yielded little sport of a very exciting character. Trout there were in the rivers that run through the valleys of Dolgelly, Llanberis, and Festiniog, but they were small and wary, and it was only very occasionally, usually just after a heavy spate, that the fortunate fisherman got hold of a sewin. My first really large fish I lost; but I remember to this day the excitement which I felt when I realised that something heavy had taken my red Palmer, and how my heart jumped in sympathy with that first leap from the water in which he displayed his silvery sides and goodly proportions. I was but a tyro then, and if I had respected and feared to lose him less, I believe he would have come home with me in my basket; but my dread of putting too great a strain on my light tackle resulted in a slack line more than once, and at last the hold gave way. Either the tender skin of the mouth broke, or the hook had worn a big hole and just came out. Afterwards, I got a few from time to time; but some of them succumbed to the attractions of a worm, near the mouth of the river. Still, my memories of Wales are rather of the beautiful fern-clad banks and other æsthetic surroundings than of any great success in the fishing line. There was more than one place near Dolgelly where great clumps of *Osmunda regalis* still grew wild. I question whether a single root now exists in any much-visited spot, even if a few in more secluded places have escaped the rapacity of the collector and the professional fern robber.

The scene next shifts to Norway, where the beautiful Rauma dashes through the valley of the Romsdal, past some of the most picturesque and romantic mountains in the world: the Trolltinderne or Witches' Peaks, with their jagged crests, and the beautiful Romsdal Horn, emerging from the fields of snow. It was early in the long vacation—still in the 'sixties—that we first experienced the delights of the long Norwegian daylight, and trailed our big flies and minnows in the wide and then unpreserved waters opposite the Aak Hotel, near Væblungsnæsset. The rods were stiff and the tackle strong, for there were salmon to be got, and big ones too, although the water was more suitable for sea trout; but splendid specimens of the latter fish were continually running up from the sea, and made desperate fights in spite of all the mean advantages of our Weaver's Beams, treble casts, and meat hooks. The old fly-book, with its crumpled vellum leaves, is still in existence, and one page records a morning's sport, when between six and eight, before the sun had put an end to the rise, I got six sea trout, the largest eight pounds and three quarters, and the smallest four; their average weight working out at over six and a half pounds. Such monsters are rare now; but the point I note as contrasting in the most marked way with my recent experience of Norway in 1901 is, that I should have caught such a bag of large fish without a considerable number of much smaller ones to bring down the average. It must be remembered that I knew little or nothing about the sport, and that my friend and myself devoted our time to rowing a boat across and across the broad water, with our two rods hanging out of the stern with a large fly and a minnow on the casts, taking, and not infrequently losing, the "goods the gods provided." I am proceeding with my recollections chronologically, and shall return to Norway again later on, when different methods gave different results.

The next scene brings us to "a damp climate contiguous to a melancholy ocean." Mr. Disraeli's famous description of the Ireland which gave so much trouble to his Government, but also afterwards did his successors the service of wrecking the party opposed to them. Damp the climate undoubtedly is; but although there were dripping days, our visit to Waterville, in County Kerry, ended with a long spell of fine weather, which put an end to our sport in fresh water, and drove us out into a sea, melancholy no longer, but greeting us with its "many twinkling smile" as we danced over its surface, loading our boat with huge pollack for want of nobler game. Waterville Lake in those days was a grand place for sea trout, and we often came home with three or four dozen in our boat, as well as a peel or two, and occasionally an old brown salmon 12 lbs. or over, the capture of which our fishermen, Mick Sullivan and Tim Healey, looked upon as the crown and acme of piscatorial success. On that occasion for the first time I had for a companion a skilful as well as a keen fisherman, one who had earned his laurels among the educated trout of Whitchurch and Hungerford. I learnt much from him both of the practical details of the craft, and of the inner workings of the mind of a true sportsman. He it was who first taught me the delights and advantages of fine tackle and a light rod. He it was, also, who tried, not always effectually, to keep our boatmen from the deep water round rocky points where the big dark fish had their favourite haunts, and declared, much to their wonder, that he would rather catch a few silvery white trout fresh from the salt water, or a bright peel, even if only three or four pounds in weight, with the sea lice still clinging to its gills, than the biggest brown kipper in the lough, even if fortune should deliver into our hands a twenty pounder. He even had the audacity to stick to his own patterns of flies, and to decline the native specific, with its body of fiery brown pigs-wool pressed upon our notice by its manufacturers and patentees who rowed our boat and were responsible for our sport. Truth compels me to admit, however, that although the denizens of the lake were not insensible to the blandishments of the grouse and grey, or even a small Blue Doctor or Jock Scott of Sassenach manufacture, it would seem that they preferred the rougher and less finished native production. Still, when the mist was high above the hills, and a steady south-westerly breeze made a good curl on the surface, they were not particular what fly they took, but rose fast and furiously at any and every lure presented to them. Loch fishing is at its best but a sorry substitute for the freedom and variety of river or burn; but the cream of the sport is to be had where sea trout and grilse frequent the loch and rise to the fly in it. There is not the same chuck and chance it feeling with which you drift along the whole side of an ordinary brown trout loch, which you do not know very well, propelling your cast before you, and only occasionally by some bank of weeds, or where a tree overhangs the water, teeming with insect life, bestirred to extra exertion by renewed and increased hope of a rise. Sea trout generally, and salmon always, have their favourite haunts, and you soon get to know the places where you may expect an "offer," and even when you do not get it, you have had the extra excitement arising from the pleasure of hope which does so much to make the charm of fishing. Constant and invariable success would soon pall upon the keenest, and change what

121.—ALL RIGHT WHEN YOU GET THERE.



122 FISHING HOUSE IN NORWAY

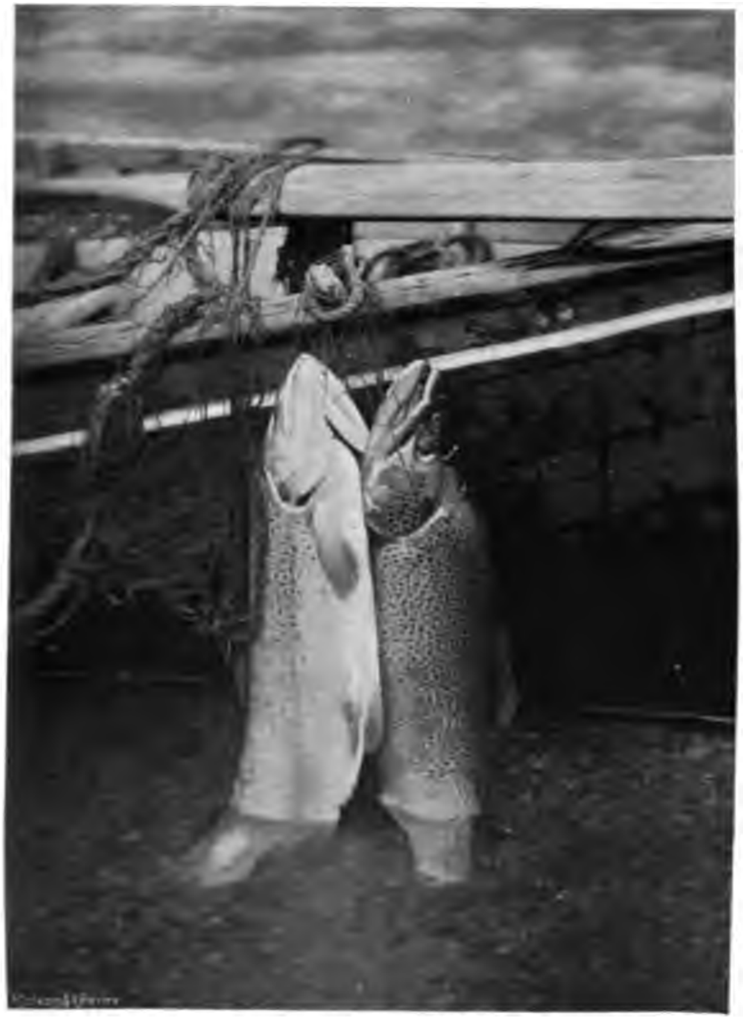
is now an art and a pastime into a dull and laborious task. You have, perhaps, been drifting over a bit of deep water, or across a shallow bay with sandy or muddy bottom unattractive to decent fish, although a very few small brown trout, locally known as "bastards," have occasionally broken the surface, but now you are coming near a beautiful little island with a ruined chapel, and an old burial-ground upon it, and you can occasionally see the bottom strewn with boulders and rocks to give shelter. Already you see from a few noisy rises that the white trout are in a feeding humour. Your chance would be good indeed, but that the island breaks the force of the wind, and the surface is but slightly ruffled just where you are passing, although a fairly strong breeze is blowing, and there is a good curl just a hundred yards ahead. There is a fish moving just where a little rock shows out of water, and you send a long cast lightly and cautiously towards him, your two flies falling almost as softly on the water as if you were dry-fly fishing for the educated inhabitants of the Test. No need to work the flies here in such smooth water by moving the top of the rod up and down. You have scarcely begun to tighten the line and draw it towards you when there is a rise at both flies, but although wrist and eye act smartly together, and there is no fault to find with the strike, the fish have seen too much, and turned on just touching the fly, and there is only just the slightest pull for one second to show that one of the two has been pricked and had a narrow escape. You just slightly shorten line and cast again at once. The pricked fish will not come again, but the other may, and it is probable that they were both only the advance guard of a shoal. This time the line tightens after a spluttering rise, and ten or twelve yards of the reel line are pulled out, before a little beauty flings himself out of the water. Be careful with him, for the chances are that he is very slightly hooked, and small as he is, he will make a desperate struggle for his life; above all beware just when you are bringing him to the landing net. He may seem to have surrendered, but he is "slim," and reserves his final effort until the line is shortened to land him, and he can get a good pull at the angle where there is least give in the rod; and very often his tactics succeed, and he escapes after all. However, as you get a little farther on you get plenty of sport where the breeze catches the water better, and you have the beginning of a very satisfactory basket when you land on the island for lunch. If you have time to light a fire, and split open and broil one or two silvery little fellows just fresh from the sea, wrapped in paper, or on a spit of bog myrtle, you must be hard to please if you do not find your meal to your liking.

Not every day on the lake was like the one just described. Often the ragged clouds gathered in from the Atlantic, and heavy squalls swept over the water, making it difficult to hold the boat, and almost impossible to make head against the breakers.

On some of these rough days those who braved the elements were rewarded for their courage and perseverance by splendid sport; but, of course, larger flies had to be used, and you sunk them deeper and worked them like a salmon fly. At other times there was sunshine and calm, with every rock and tree reflected in the mirror of the surface, and even then a fish or two could be secured by sending a small fly almost dry, with a long line, lightly into the centre of the rises.

But I must delay no longer with Ireland, but turn to Scotland, where my experience of sea trout fishing is not that of a casual visitor, but of a resident who has made it his second home for more than a generation. There is hardly a county in that part of the kingdom where I have not caught some, from Roxburgh and Dumfries on the border to Ross-shire and Sutherlandshire in the north. In the east the Carron and the Shin have contributed their share, and also the tidal reach between the two rivers, the upper waters of the Dornoch Firth, into which they both discharge. It is, however, more than thirty years ago that I fished those waters, when my father was the shooting tenant of Invercarron, and Charlie Hall, afterwards Recorder of London, and his father, not yet a Vice-Chancellor, rented the fishing of the Shin below the falls, and lived and entertained their friends at the inn. There was a deep pool just below the Falls of Shin which afforded great sport, although better for salmon than for sea trout. I remember a rather ghastly anecdote, told me either by Charlie or his brother. A man had been drowned in the pool, which was very rocky, with a back current, and a professional diver was employed to recover the body. Hall had lost a favourite walking-stick in the pool, and offered a reward for its recovery. When the diver brought the stick back he was asked whether he had succeeded in the main object of his search. Oh yes, he said, he had found the body wedged in upright between two rocks, and the curious thing was that there was another — a skeleton — beside it. When asked whether he had rescued the remains so unexpectedly discovered, he answered that he had not. "I was not employed to do it, and it was no business of mine."

As far as I know none of the east coast rivers compare favourably as regards sea trout fishing with those on the west, and such small rivers as the Ruel or the Add, in Argyllshire, still give excellent sport, and used to be far better in the happy days gone by. When I first knew the Add in 1868 it was, as it still is, an uncertain river for salmon; very few rose, considering the number in the pools, and it required a very good day with a flood just running down to be certain of two or three grilse. But sea trout could be confidently reckoned upon as a *pièce de résistance* at all times in the lower pools, and a day after the water was too low for salmon fishing in the upper reaches. As I have fished in that beloved stream many times oftener than in all other rivers and lochs put together, I will treat it



123.—NEW ZEALAND TROUT.

124. A VERY LIKELY CAST.

as typical of a small sea trout river and give it a section to itself.

THE ADD.

The Add presents an epitome in miniature of almost all varieties of sea trout fishing. In its upper portions, where it runs through its rocky channel in a deep and sometimes unapproachable gorge, it is just an ordinary type of West Highland stream, only fishable with any prospect of success immediately after a spate, when, as the discoloured water begins to clear, these fish rise greedily just above and below the deep pools, usually monopolised by the salmon or grilse. Here there is no need of elaborate casting or very fine tackle; there is stream enough to carry down your fly and straighten your line, however curved it may have been when it first met the water. The fish mean business and will make the most of their time, although they do not know as you do that the water will hardly be in fishing order for more than a couple of hours. Next, the stream reaches the strath, a narrow glen just above the little village of Kilmichael Glassary, where a branch road crosses it by two substantial stone bridges, and a narrow strip of arable and pasture land separates it from the hill and grouse moor. Here are some of the best high-water salmon pools. The river is still rocky and fairly rapid, and early in the year a very small flood tempts both grilse and trout to run straight up as far as the Irishman's Pool, a deep rocky bend of the stream where, although I have heard it contemptuously described as "no bigger than a wash-tub," I have taken as many as seven salmon between half-past ten and two o'clock. This pool is not a great place for sea trout, which is perhaps as well, as it is tiresome to have your best water disturbed by the spluttering and splashing of a half-pounder; but the long reach immediately above it, which runs under the wooded brae of Kirnan, makes up for its deficiencies in that respect. This is, as it looks, an ideal place for sea trout, which may be caught anywhere along the whole length of 200 yards or thereabouts. The stream is just the right width for a fairly long cast with a trout rod, and of moderate depth, deepest under the far side, and becoming gradually shallower towards the bank from which you fish, with a strong but fairly smooth bottom, and sufficient stream to carry the fly round comfortably from the point where it touches the water until it is opposite to your feet. When you have got one or two salmon and grilse out of the Irishman, and, in spite of your efforts to prevent them, they have persisted in disturbing all the best part of the pool, you can change your cast for one with two or three small sea trout flies upon it; and by the time you have fished the Wood Pool the Irishman will be rested, and you will probably have a fair number of trout, varying from 3 lb. to about 1 lb., in your basket. Sometimes I have hooked two or even three at a time, and it required some care to land them properly, as there were, when I last fished it, more than one uprooted fir tree overhanging the stream at right angles, with some branches resting on the bottom, and also a good many piles on the near side, originally put in to protect the bank, but now left by the encroachment of the flood a yard or more out in the stream. These obstacles afforded considerable vantage ground to the fish, and as there was no sheltering bank of gravel on which to land them, a good many succeeded in making their escape; but, as the pool was an easy one to net, it was not thought advisable to clear away obstructions which served the purpose of protecting the fish from poachers, as well as making the angler's task a little more difficult. Sir Herbert Maxwell, whose authority is so high and absolute on all questions of fishing and natural history, says "that the salmon trout generally, it may be said always, refuses a second offer at a fly he has missed." It is only with the greatest diffidence that I venture to differ from so accurate and careful an observer, but I am convinced that I have risen the same sea trout twice many hundreds of times, although the second rise was invariably a shyer one than the first, and therefore only a smaller proportion are hooked. After two attempts they will seldom do more than follow the fly and turn without attempting to take it, and it is certainly true that they are much more reluctant to repeat the process of rising than their big brother the salmon. It is no use resting them after a rise; they are generally moving about in the pool, and if you waited five minutes, as is the orthodox plan with salmon, might probably be by that time well out of reach of your cast; whereas the salmon rises from his lurking place by some rock or shelter in deep water, and returns to the same place where he has missed the fly, and is often ready for another attempt over and over again. How often have I made a mark with my heel when I happened to be standing where a grilse or salmon rose at my fly, and hooked him fairly at identically the same spot after fishing the pool down before returning to my mark.

I must not detain my readers by describing at length the various casts above Dunadd. There are not many yards of the river where sea trout cannot be taken at various heights of the water. Experience taught me where to find them at any and every condition of the river, but the only general law I can lay down for the benefit of the uninitiated is that, as the water fell they gathered out of the runs and into the pools. The farther you went down the stream, the more sinuous it became, and the current gradually lessened in velocity, as the water cut its channel deeper through the soft peat moss and alluvial deposit, until towards the bottom the great deep pools in each successive horse shoe resembled miniature lakes rather than running water, and at ordinary times you could fish indifferently up or down stream, according to the direction of the wind. I have had grand sport occasionally when the waves were actually breaking on the surface with the violence of the gale; but it was difficult enough to keep the line in the water, and could only be effected by letting the fly sink deep and keeping the top of the rod close to the breakers. At such times you could seldom see a rise; but those fish which rose below the surface when your line condescended to keep straight, were generally firmly hooked, and were brought to the net in spite of the strain imposed on the light tackle by wind and water, when playing them with the full force of the wind upon the line.

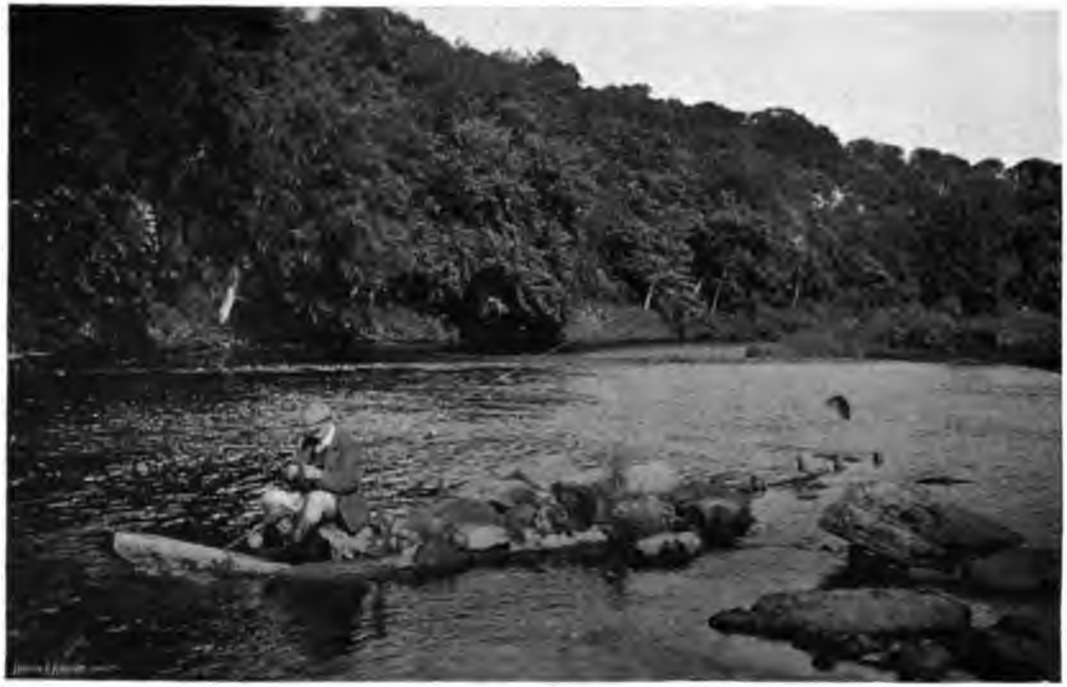
The great advantage of these lower pools was that you were practically independent of the rainfall. In the greater part of the river it was little use to fish except after a flood, but here every tide brought up some of the shoals which were waiting in the estuary; and some could always be caught when there was enough breeze to ruffle the surface. The best time for fishing was when the tide was just beginning to rise, which seemed to excite the fish and whet their appetite for the fly. For a short time—never more than half-an-hour—after first of flood the rise continued, and the fun was fast and furious, but when the gravel began to float up on the surface and the current to deaden, sport was over for the day, as not a fish would move. The water in these lower pools was never salt, but only backed and driven up by the tide lower down by Crinan, where it was quite salt. Good sport could also be had from a boat just when the tide was making. The old Laird of Poltalloch, my father-in-law, told me that he on one occasion caught ninety-nine sea trout at a single tide, but could not make up the hundred, although he went on, hoping against hope, long after the rise had ceased.

Even when the pools were clear and glassy and unruffled by so much as a cat's-paw, I have met with some success in the lower horse shoe. Early in June there is a run of small finnocks of about half a pound which come up a little way from the sea, and can be seen rising at the natural fly which comes floating down the stream. It is no use fishing in the ordinary way in the calm clear water; but with the finest gut and a single small trout fly such as a Greenwell or even a Black Gnat, by watching for the rise and fishing up stream with a dry or just sunk fly, I have occasionally got a good basket of these beautiful little fish. They are just in the pink of condition and strength, and with the very small hooks and fine tackle are able to make a gallant fight for their lives. More skill is required to make a basket than in any other form of sea trout fishing. You must keep out of sight, as if you were stalking south-country trout in a chalk stream. The cast must be long, light, and accurate, almost into the centre of the rise, and the strike must be at once quick and moderated, as an ill-regulated violence is fatal to the fly or the hold. Then your fish is bound to see the net and yourself when you are about to land him, and is sure to make that last desperate effort to escape which so often succeeds. At all times when fishing for sea trout be careful not to reel up too much line before you attempt to get the landing net under your fish; if he can bolt when you have only some eight feet beyond the top ring of your rod, he will probably break either the hold or the cast. I lost the best trout of the day, on the last lawful day of the season in Norway in 1901, by neglecting this precaution. He had been running some time and seemed quite tired out and safe, when I unwarily fell into his snare and brought him too close. He revived as by a miracle, and although I helped the reel and lowered the point of my rod, the strain was fatal to the much tried cast.

A spring day on the west coast of Scotland, within a mile or two of the sea, is so exhilarating and delightful that one can be content with moderate sport. Such holidays must for me of necessity be brief interludes in a London season, and I and my black spaniel rejoice to exchange flags and pavement for bents, rushes, and heather. The air is musical with the plaintive whistle of curlew and redshank; and a pair of mergansers, the drake in all the glories of its breeding plumage, dive about in the pool so persistently and tamely that it is evident that the nest is not far off. Once or twice they pop up so near me that I am tempted to cast my fly over them and try to hook them; a vain attempt, as they can dive faster than I can cast. All the time the anxious lapwings blunder over "Ben," the spaniel, as he hunts along the bank, and even occasionally alight within a yard or two of him and tempt him to run after them and away from the small members of their family, who are crouching in the grass not far away. One tiny peewit had fallen over the steep bank, and would have perished by starvation or been drowned at the next rise of the water if I had not stumbled upon him when taking shelter from a shower, and restored him to his anxious parents.

SEA TROUT FISHING IN NORWAY

My last experience of sea trout fishing was in the Sundal River in Norway, of which I rented some six miles from August to the end of the season in 1901. The best of the salmon fishing is over by the end of July, but the river literally teems with fresh run sea trout, and as the stream is very strong and wide, they give the most excellent sport when fairly treated in the matter of rod and tackle. I was most unfortunate in my weather from a fisherman's point of view. The snow had all melted off the high hills, and we were favoured with brilliant sunshine and an absence of rain right up to the end of the season. Even under these unfavourable conditions, with occasional assistance from two other rods, I managed to get nearly 500 of these fish and about 50 grilse, and I do not doubt that the bag might be easily doubled in a normal season. The best time for catching them was just about dusk, when there was usually a determined rise however



125.—CHANGING THE FLY. (LOCH FISHING.)

bright and low the water had got. To take advantage of this, involved stopping out very late—at first until past midnight—and, as I did not care to stop indoors during the day, and found eight or nine hours' fishing enough, I did not very often trouble them at their late dinner. I found that I could get enough for sport and the pot at my own time; but old stagers used to do most of their fishing late, and adjust their meals and other pursuits according to the all-important demands of the sport. I have not the faintest doubt that they were right, and do not hold out my example as one to be followed. When the sun was shining on the water it was very little use fishing, but even then I got a few in the very strong water just above and below the actual rapids. In other places one could see the fish following the fly at almost every cast, but they could see too much to be tempted actually to take the fly. There was one pool called Carlton, a strangely familiar and not very Norwegian sounding name, where I almost always got one or two big fish about 3 lbs. in weight, and where the pleasure of catching them was enhanced by the fact that the water was very strong, almost a rapid, in which I do not think I should ever have thought of casting a fly had it not been for the advice of my gillie, who knew that when the river was low it was one of the very best casts, both for grilse and trout. The first time I tried it, I had to give it up in despair; it was necessary to wade above the knees, and the difficulty of standing in the strong stream was enhanced by the fact that it ran over large, smooth rounded boulders, polished to the acme of slipperiness. I had on over my waders an old pair of brogues, of which the nails had been polished by two years' use on gravel and sand. It was literally impossible to maintain a footing, and after tumbling over two or three times and getting my waders full of water, I gave it up in despair. Later on I returned to the charge, after having a lot of new nails put into the soles of the brogues; but I also found it advisable to arm myself with a landing net with a stout handle, which I used as a staff to steady myself before and after casting across the stream. To those who want to know how a 3-lb. trout can fight, I can confidently recommend Carlton stream. My fish has often had out sixty yards of line and nearly got to the impassable rapids at the bottom almost before I have been able to steady myself to get on terms with him. Fortunately, no fish willingly goes out of a pool through very rough water, or a great many more lines would be broken and casts cut; but when a frightened fellow "did face the music," it was good-bye to fish and cast, at least unless the hold gave way. Generally it was a short fight and a merry one. A fish is sooner drowned in rough water than in a deep still pool, and if he is still for long in a rapid, you will generally find that he has got you round a rock, and should shift your ground and try him at different angles, or even "hand line" him if other methods fail to move him.

The only general maxim derived from my Norway experiences which I would impress upon my readers, is never to fish from a boat if it is possible to do justice to the pool by wading or from the shore. Sea trout are very shy of a boat, and never rise freely after it has passed over a pool. There was a beautiful pool below my water which could easily have been fished by wading, which the lessees used to drift down every day once only, and which was so ideal a place for sea trout, that they might have had a whole day's sport there if they had been content only to use their boat for crossing the water.

The best kind of river for sea trout fishing is one where no boat at all is used or needed. There is a small river of this description which flows into the fiord opposite to Sundalsoren, where the lessee, one of the pioneers of Norway, gave me a day or two's fishing, which he rightly regards as an absolutely ideal place for the sport. He may well be proud of the stream, as he is not only its proprietor, but to a great extent its creator also. The river, when he first knew it, was a mere torrent, nearly all "white water," about eight miles from the house he occupied on the Sundal, and there were one or two pools near the mouth which he and his partners used occasionally to fish when for any reason the large river was not in order. When he took a long lease of the fishing from the riparian owners, he was laughed at by his friends for wasting his money on a stream with hardly any fishing water; but he knew very well what he was about, and at once set to work to "improve nature." Labour is cheap in Norway in the winter, and huge stones can be moved on sledges and along the ice of the river itself, which is always completely frozen over. Thousands of great blocks were so moved and deposited on the ice over the places where they were destined eventually to rest, and as the ice melted they became permanent dams, putts, and embankments, with the result that almost the whole river is now a succession of runs and pools admirably suited for sea trout, and fishable (and fished) entirely with single-handed rods. The sea trout run very large, great numbers being of the weight of 5 lbs. and over, and some reaching the weight of 16 or 17 lbs. Salmon have hitherto never been caught in the stream with rod and line, but just at the time that an extension of the fishing season had been asked for from the local authorities, on the ground that it was not a salmon river, a combined landslip and avalanche killed all the fish in one of the upper pools, and disclosed the corpses of a number of good-sized salmon. I cannot imagine a more delightful spot for any one who is fond of sea trout fishing; the house stands high, in magnificent scenery, just above one of the best pools, and overlooking the fiord, where there is first-rate sea-fishing and a beautiful little lake. The fish are numerous and heavy, and rise freely, and fight desperately in water where they have every chance of making good their escape. The precaution I advised in a former chapter, of having a quantity of backing on the winch, is absolutely essential here. The pools are so short that a desperate fish often runs through rough water from one to the other, especially in the pools near the sea, and an encounter with a large fresh-run sea trout hooked on light tackle with a 10-foot 6-inch rod is as exciting and calls for as much skill as the capture of a monster salmon—or even a tarpon. It is above all things suitable for ladies. Many of the pools can be fished from the sides without any need for wading; and skill rather than strength and endurance is required for success. In this quality, as we all know, the fair sex is not deficient.

In the British Isles such a feat of transformation as I have just described would, of course, be quite impossible. We have not the frost and snow which render the movement and placing of enormous weights reasonably practicable. It by no means follows that nothing can be done to improve sea trout fishing in our own waters. By clearing out or widening small burns between a loch and the sea; by blasting or putting ladders over impassable falls; by cutting a channel beside the rocks for streams which waste themselves by spreading over a large expanse of sand, sea trout may be induced to take up their habitation in many places which now lack their genial presence. If some such experiments should fail, those who succeed will find themselves amply rewarded even for much labour and expenditure.

PART III

CHARR AND GRAYLING

CHAPTER XXVII

THE CHARR (*Salmo alpinus*) AND ALLIES

By G. A. Boulenger, F.R.S., V.P.Z.S.

The section *Salvelinus*, of which *Salmo alpinus* is the type, differs from the salmon and trout in the form of the vomer, or anterior median bone of the palate, between the paired palatines. This bone is boat-shaped, the shaft not being on a level with the head, but forming a step with it (see Fig. 2, p. 8); teeth are present on the head of the bone, where they form an isolated group, but never on the shaft.

As regards our northern species, the absence of black spots on the body, and the usually smaller size of the scales, are readily ascertainable distinctive marks as compared to trout.

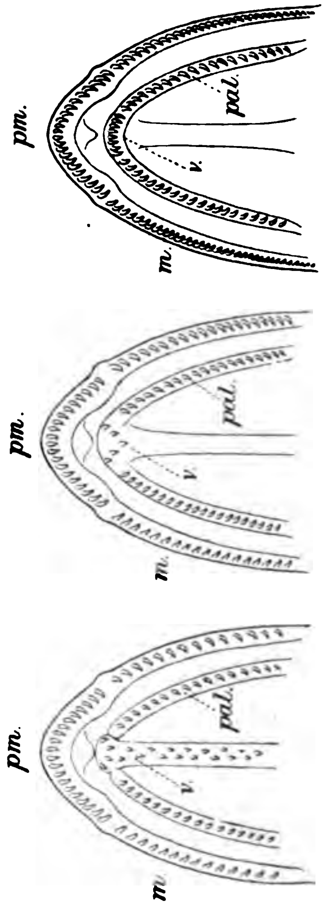


FIG. 5.—DENTITION OF UPPER JAW AND PALATE OF A, *Salmo trutta*; B, *Salmo alpinus*; C, *Salmo hucho*:—*m.*, Maxillary teeth; *pal.*, Palatine teeth; *pm*, Premaxillary teeth; *v.*, Vomerine teeth.

The best-known and most widely distributed species, the one represented in our British and Irish lakes, is *S. alpinus*, a graceful and delicious fish, which may be characterised in the following manner:—

Form elongate; mouth large, the upper jaw extending to below the posterior third of the eye in the young, to beyond the eye in the adult; dorsal fin with 10 to 14 rays (8 to 10 branched); anal with the same number (7 to 9 branched); caudal fin more or less emarginate, truncate in old specimens; scales minute, 120 to 145 in the lateral line (tubular scales), 200 to 240 in a series from the head to the caudal fin, above the lateral line, 25 to 35 across between the rayed dorsal and the lateral line, 18 to 22 between the adipose fin and the lateral line; dark olive, bluish, or purplish-black above, with or without round orange or red spots, pinkish-white or yellowish-pink to scarlet or claret-red below; the pectoral, ventral, and anal fins of the colour of the lower parts, rarely blackish, with a white or orange edge; caudal fin sometimes edged with red. When the charr go to sea, they assume a more silvery colouration, similar to that of the salmon and sea-trout; the red spots become very indistinct, and the lower parts are almost white. The very young are also silvery on the sides and white below, and bear 11 to 15 bars, or parr-marks, on the side.

As in our three-spined stickleback and minnow, the red colouration which renders these fish so remarkable, is part of the nuptial dress, and is more intense in the males. It varies somewhat according to localities, and these differences, together with a few structural points of doubtful constancy, have given rise to a great number of untenable so-called species, as many as six having been ascribed to the British and Irish fauna, viz., *S. alpinus*, *nivalis*, *killinensis*, *willoughbyi*, *perisii*, and *colii*. In other parts of Europe, also, various local forms have been distinguished, such as the "Omble Chevalier" of the lakes of Switzerland and Savoy (*S. umbla*); the "Säbling" of the lakes of South Germany and Austria (*S. salvelinus*); the "Kullmund" of Norway (*S. carbonarius*), &c. Whilst the North American *S. parkei*, *alipes*, *stagnalis*, *arcturus*, *areolus*, *oquassa*, and *marstoni* may also be regarded as varieties of *S. alpinus*.

Although *S. grayi*, from Lough Melvin, Ireland, has also been placed by some authors in the synonymy of *S. alpinus*, I am much inclined to maintain it as a distinct species, and it is certainly more different from the type than any of the numerous forms mentioned above. The form is less elongate, the caudal peduncle (or muscular part of the tail between the anal fin and the scaly base of the caudal fin) being only once and a half as long as deep, the pectoral fin is longer, at least as long as the head, and the scales are larger, there being 112 to 116 in the lateral line, and 160 to 180 in a longitudinal series between the head and the caudal fin, above the lateral line. Back bluish-black, sides silvery, with scattered light orange-coloured dots; belly with a reddish shade; fins blackish, ventrals with a narrow whitish margin. This charr does not exceed a foot in length.

Salmo alpinus varies much in size according to the waters it inhabits. Whilst in some of our lakes it remains dwarfed, not over ½ lb. in weight, it reaches in Lake Wetter a weight of 18 lbs. and a length of 2 feet. Specimens of 18 to 20 lbs. are on record from the Lake of Geneva. In many parts of Sweden a charr 1 foot long, or weighing 1½ lbs., is considered an average-sized fish. With us, the fish is usually smaller, but in the Lake district and in Scotland specimens have been captured from 1½ to over 2 lbs.

Salmo alpinus has a wide distribution. In Central Europe, in the British Islands, and in the greater part of Scandinavia, it is confined to mountain lakes, but farther to the north, in both the Old World and the New, it lives in the sea and ascends rivers to spawn. In Lapland, Iceland, Greenland, and other parts of the Arctic regions, it ranks among the commonest fishes. The extreme northern point at which the charr has been obtained is 82° 34′ lat. (Victoria Lake and Floeberg Beach, Arctic America). It reaches an altitude of 2600 feet in the Alps and 6000 feet in the Carpathians. It is found in the Orkneys and Hebrides; in Scotland in many lochs of Sutherlandshire, Ayrshire, Inverness, Perthshire, Wigtownshire, and Kirkcudbrightshire; it has disappeared from Loch

Leven, where it existed in the beginning of the last century; in England in the Lake districts of Cumberland, Northumberland, and part of Lancashire; in North Wales, from about 1500 feet altitude; in Ireland it occurred in many loughs and small mountain lakes, but has now disappeared from some. A full list of the numerous Irish localities is given in Day's "British Salmonidæ."

The American brook-charr, *Salmo fontinalis*, is a close ally of *S. alpinus*, differing from it in having fewer and shorter gill-rakers (17 to 20 on the anterior branchial arch), a rather stouter body, the back more or less barred or marbled with dark olive or black, and the dorsal and caudal fin mottled or barred with darker; sides with red spots; lower fins with a pale, whitish, yellow, or orange anterior edge, margined with darker. Many local varieties of colour have been distinguished. Sea-run individuals often nearly plain bright silvery. A small species, growing to about 18 inches, abundant in all clear, cold streams of North America east of the Mississippi, northward to Labrador. The fish has been introduced in other parts of the United States and also in Europe. It was first introduced into England from Lake Huron, Canada, in 1871, and since that time the import of eggs has become a regular business.

Another remarkable charr is the Great Lake charr of North America, *Salmo namaycush*, one of the largest Salmonids, said to attain a weight of 100 lbs. The head of the vomer is produced behind in a raised crest free from the shaft, and bearing a series of teeth, a character which is deemed of generic importance by American ichthyologists, who have created for this charr the genus *Cristivomer*. The body is very elongate, and covered with extremely small scales. The colour varies from grey to black, with numerous round pale spots, which may be tinged with reddish, the dorsal and caudal fins reticulate with darker. This fish inhabits the Great Lakes region, and neighbouring parts of North America, extending north to the Arctic Circle; it is said not to enter tidal rivers.

CHAPTER XXVIII

ANGLING FOR CHARR (*Salmo alpinus*)[1]

By R. B. Marston

The charr of the British and Irish lakes, although differing in shape and colouring in different waters, are practically identical with the charr of the Alpine lakes of Switzerland, the Tyrol, and Northern Italy —called by ichthyologists *Salmo alpinus*, also *Salmo salvelinus* and *Salmo umbla*. I think *Salmo alpinus* is the most appropriate name for our fish, as it is only found in mountain lakes and tarns, and in their tributaries at spawning time.

One of the most beautiful sights in the world is to look down upon Lake Windermere on a calm evening, when its surface reflects the clouds and mountains all aglow with the red and gold of sunset, and watch the charr rising. The fish love this evening time, and appear to have become themselves coloured with the ruddy golden tints of sunset. You might easily imagine that long, narrow, deep red opening in the clouds between Coniston Old Man and the Langdale Pikes to be a giant charr—the fish with the red belly. In shape it is like the trout, but of more slender build, the back is a rich brown, shading off into olive half-way down the sides, then becoming a deep reddish orange, which covers the belly and colours all the fins except the back fin and tail, which are like the back; small red spots are dotted all over the sides. A characteristic mark of the charr family is that the first ray of the ventral and anal fin is white.

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[1] In the *Fishing Gazette* for July 19, 1902, in an article on "Fishing on Windermere," I gave an account of plumb-line fishing for charr, with illustrations.

It is a pity that this very beautiful fish, so greatly prized as a table delicacy, is not of much account from the angler's point of view in our country. It is occasionally taken with the fly, and from what I saw of it on Windermere I think that if ever I get the chance again I shall try the following plan. On a fine gut cast I should fix three or four double-hook midge flies—with the hooks whipped together, not brazed[1]—at intervals of eighteen inches or two feet.

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[1] I can strongly recommend these small trout flies, dressed on double hooks as first suggested by my friend Mr. E. M. Tod, and made by Mr. Forrest, of Kelso, and also by his son, Mr. John Forrest, of Thomas Street, Oxford Street, London. They are invaluable in dry-fly fishing when a very small fly must be used. —R. B. M.

The flies I should oil with paraffin to make them float, and the reel line, a fine one, I should rub with deer's fat so that it would also float on the surface. Then on some fine evening when the charr are breaking the surface as they feed on the minute flies floating on it—and some evenings I have seen a good sprinkling of these small flies on the water—I should row out where the rises were most plentiful, cast a long line, then pull out twenty more yards or so of it, and gently row away until my floating flies were forty or fifty yards from the boat; for I noticed that the charr will not often rise within ordinary casting distance. It is wonderful at what a distance one can see the floating midges. Of course, my plan might not answer—the game might not be worth the candle, but it would be an interesting experiment. If it did not answer for charr out in the middle of the lake I feel sure it would answer near the sides for trout, on those windless or almost windless evenings when it is impossible to get near enough to rising fish in a boat to fish for them in the ordinary way. On these calm evenings the trout roam about sucking in the flies on the surface, and when one came across my little floating "Greenwell's Glory," "Tod's Fancy," "Light Olive," and "Little Marryat," I think he might be tempted.

The Windermere charr must still be very plentiful, as sometimes as much as six thousand pounds weight are taken by the netsmen in a season. The nets are now restricted to those used by the Lake District

Angling Association, and the proceeds of the fishery go to the preservation and re-stocking fund. Thousands of charr are also taken by the "plumb line" fishermen during the season. In this fishing a heavy flattened lead with a fixed rudder-shaped projection is used to sink a long line. The lead or "plumb," as it is called, has the rudder in order to prevent its turning round and so twisting the line above it, which is suspended from a stout bamboo or ash rod which projects over the side of the boat.

This plumb-line fishing for charr requires a good deal of practice, and is very uncertain and monotonous work. Still it is well that the angler should understand it, as the tackle is easily made, and it is quite possible that if its use had been understood, many an exploring expedition would have been saved from starvation among the mountain lakes of Northern Asia and America, which, as a rule, abound with some kind of charr.

Although probably not quite the same as our fish, the charr is found in the rivers of Northern Scandinavia, and takes the fly well, and runs to some pounds in weight; in Iceland also it is quite as common as trout in some of the rivers, and gives fine sport—in fact, the trout and charr are often a nuisance to the salmon angler.

The native "trout" of America are all, or nearly all, more closely related to the charr family than to the common trout, *Salmo fario*, of Europe. The very famous American brook trout, *Salmo fontinalis*, is a charr, and has the peculiar white ray in the belly fins; this charr has been distributed all over Europe during the past quarter of a century, but it does not thrive in our rivers, and like the rainbow trout it disappears sooner or later—generally sooner. The rainbow trout, *Salmo irideus*, is more nearly related to the migratory Salmonidæ of the Pacific Coast of North America than to the charrs. But trout nomenclature in America is absolutely bewildering, and it is therefore interesting to find that Messrs. Jordan and Evermann, the chief American ichthyologists, give it as their opinion that "it is not unlikely that, when the waters of the northern hemisphere are fully explored, it will be found that all the black-spotted trout of America, Europe, and Asia, are forms of one species for which the oldest name is *Salmo trutta*"—the sea-trout of Europe and Asia.

Although our charr do not often exceed two pounds in weight, they have veritable giants in America. The "Great Lake Trout," *Cristivomer namacush* (from *crista*, "crest," and *vomer*, "the bone in the roof of the mouth"), is said to grow to over 100 lbs. in weight, though the largest of which I can get any authentic record is one of over 80 lbs., said to be preserved in one of the Canadian museums.

Jn. Yarrell says that in the autumn of 1839, T. Upton, Esq., of Ingmire Hall, near Sedberg, put into his lake, the Lillymere, near the reservoir, some charr from Windermere, each weighing about half a pound; and, on the 23rd of August, 1840, caught two with fly full two pounds' weight each, in the finest possible season, well fed, and beautifully coloured. These fine specimens were served at the Queen Dowager's table, at the "Rose and Crown," Kirby Lonsdale.

This is very interesting as proving that the fish grew from half a pound to two pounds in about twelve months, also that they not only do well in a small lake, but will take the fly.

Is there not a suggestion in this for our fish-breeders? I think there is no doubt whatever that the Lake District Angling Association would be willing to exchange live charr for live trout, or even to permit ova to be taken when the Windermere fish ascend the Brathay to spawn. Yarrell mentions a curious thing in connection with the Windermere charr. The lake has two principal feeders, the Rothay and Brathay—pretty little trout streams; the Rothay has a sandy bottom, but the channel of the Brathay is rocky. These streams unite at the western corner of the head of the lake, below Clappersgate, at a place called the Three-foot-brander, and after a short course boldly enter the lake together. The spawning season is in November and December, about which time the charr in shoals make their way up both those rivers, but invariably, before depositing their spawn, those fish which have ascended over the sandy bed of the Rothay return and pass up the rocky channel of the Brathay. The trout, on the other hand, prefer the Rothay to spawn in. Another spawning place of the Windermere charr is in the last length of the little burn which falls into the lake near Grass Island—so the charr netsmen told me when I was fishing there in May 1902. They were very civil and intelligent men, and I was glad to hear from them that they *know* there is now, as one of them expressed it, a "heavy head of trout" in the lake. And they ought to know, for they are constantly at work with their great nets after the charr. It is very interesting to watch this netting, as I often did. In the spring, when the fish swim not far from the surface, you see a long black boat swiftly crossing the lake with two men in her and a big black heap in the stern. An anchor is thrown amongst the rocks on the shore, the men then pull out and make a great semi-circular sweep, dropping the net overboard as they go, and when they get to shore again one hauls in one side of the net and one the other, gradually walking along the bank till they meet, and the net is drawn out on to the shore, with perhaps one or two dozen charr, averaging three to the pound, and a few trout—the latter are carefully put back. The net in this case only hangs a dozen or fifteen feet from the corks on the surface, and the wonder is the charr do not dive to avoid it as carp would. At other seasons, when the shoals of charr swim at greater depths, they have to fish much deeper for them.

According to Max von dem Borne the eggs of the charr number from ten to thirty thousand, are of a dull yellow or reddish colour, and from four to five millimetres in diameter, which is about the same size as trout eggs, so I should question whether ten thousand is not much too large an average, since the trout averages but half that number.

CHAPTER XXIX

THE GRAYLING AND WHITEFISH

By G. A. Boulenger, F.R.S., V.P.Z.S., &c.

The Grayling (*Thymallus*)

This genus differs from *Salmo* in the smaller mouth with comparatively feeble dentition, in the larger scales, and especially in the much greater development of the dorsal fin, which contains 20 to 24 rays. These beautiful fishes, of which five or six species are known, inhabit the fresh waters of Europe, Siberia, and the northern parts of North America.

The European species, *Thymallus vulgaris* or *vexillifer*, attains, though rarely, a length of 2 feet and a weight of 8 lbs.—as a rule, however, a grayling of 1½ feet in length and 4 or 5 lbs. in weight is regarded as a large fish. The body is elongate, the snout short and rounded; the mouth extends to below the anterior third of the eye; the scales number 75 to 85 in the lateral line; the dorsal fin is more or less elevated, especially behind, and of its 20 to 24 rays, the 4 to 6 anterior are simple, unbranched; the ventral fins are inserted below the posterior third of the dorsal; the anal fin is short, formed of 11 to 14 rays, 8 to 10 of which are branched; the caudal fin is forked. The colours during life are remarkably changeable and iridescent; small dark spots are sometimes present on the body; the dorsal fin is beautifully marked with purplish bands and ocelli.

The grayling or umber has attracted attention from the remotest antiquity. The name *Thymallus* (θύμαλλος) dates from Ælian, about the year 120, and refers to the thymy odour of the fish when freshly captured. "And some think," says Izaak Walton, "he feeds on water-thyme, for he smells of it when first taken out of the water; and they may think so with as good reason as we do that the smolts smell like violets at their first being caught; which I think is a truth." It is an inhabitant of lakes and rivers, especially such as have a sandy or gravelly bed.

In England and Scotland the grayling appears to have had originally a rather irregular distribution, but it has now been successfully introduced into a great number of rivers, including the Clyde, the Teviot, the Tweed, and the Tay. It is at present particularly abundant in the Avon, the Itchen, and the Test. It is absent from Ireland.

Outside the British Isles, the grayling has a wide distribution, occurring in Lapland, in Scandinavia, in Germany, in France, in Switzerland, in Austria-Hungary, and in North Italy. It is represented by allied species in Siberia (*T. pallasii*) and in North America. The American species are three in number: *T. signifer*, the Arctic grayling, from Alaska; *T. tricolor*, from Michigan; and *T. montanus*, from the rivers emptying into the Missouri above the Great Falls. The largest grayling do not exceed a weight of 9 lbs.

THE WHITEFISH (*Coregonus*)

These are somewhat herring-shaped, silvery Salmonids, with small, toothless, or feebly toothed mouth, and rather large scales, distributed over Europe, Asia, and North America, some species living in the sea, but mostly inhabiting clear lakes. The highly esteemed *Lavaret* of Savoy, the *Felchen*, *Kilch*, *Gangfisch*, *Palée*, *Gravenche*, *Féra* of Switzerland and Southern Germany, the *Sik* of Sweden, belong to this genus, which is represented in our waters by the houting, *C. oxyrhynchus*, occasionally found in the North Sea, the gwyniad, *C. clupeoides*, of Loch Lomond, Haweswater, Ullswater, and Bala, the vendace, *C. vandesius*, of Loch Maben, and the pollan, *C. pollan*, of Lough Neagh, Ireland. The species are more readily distinguished than in the genus *Salmo*, the shape of the snout, and the number of scales in the lateral line affording characters easy of appreciation. Our British species may be discriminated in the following manner :—

Coregonus oxyrhynchus.—Snout conical, much longer than the eye, strongly projecting beyond the mouth; 75 to 80 scales in the lateral line.

C. clupeoides.—Snout truncated, not, or but little, longer than the eye, slightly projecting beyond the mouth; 75 to 90 scales in the lateral line.

C. pollan.—Snout rounded, nearly as long as or a little shorter than the eye; upper and lower jaws equal in front; 78 to 90 scales in the lateral line.

C. vandesius.—Snout shorter than the eye; lower jaw projecting beyond the upper; 68 to 71 scales in the lateral line.

Coregonus clupeoides, it should be added, is regarded by some authorities as a mere variety of the *C. lavaretus* of Central European lakes, and *C. vandesius* and *C. pollan* may be merely forms of *C. albula*, a species widely distributed over North-Eastern Europe and entering the Baltic Sea.

Secondary nuptial sexual characters are by no means so well marked in the *Coregonus* as in the *Salmo*, but pearl-like excrescences may appear on the scales during the breeding season, and are more prominent in males than in females.

The name whitefish, by which the *Coregonus* are generally known, is a translation of the Welsh name "Gwyniad," derived from *gwyn*, "white." The scientific name, of Greek derivation, refers to the anterior angle formed by the pupil of the eye, a character which may be observed to a greater or less degree in many other Salmonids.

The vendace is much esteemed at the lakes in Dumfriesshire, where it occurs in large shoals, retiring to the great depths during the warm months. It rarely exceeds a length of 7 inches. The gwyniad, which grows to over a foot, is much less valued, its flesh being described as dry and insipid. In this country, the whitefish are only netted, and are believed not to take the hook. However, Parnell says the gwyniad are occasionally caught by the artificial fly, and the closely related American species are said to afford good sport in some districts, taking the fly freely, as well as the hook baited with small grasshoppers or bits of fresh meat. The small size of the mouth does not allow these fishes to attack large prey; they feed chiefly on worms, molluscs, fish-fry, insects, and especially on small crustaceans.

CHAPTER XXX

ANGLING FOR GRAYLING

By R. B. Marston

(*Thymallus vulgaris* and *Salmo Thymallus* are its most common Latin names; French, *Ombre commun;* German, *Die Aesche;* Norwegian, *Harr;* Italian, *Temolo.*)

The grayling is one of the most beautiful, and in many respects most desirable, of our fresh-water fish, and it is a matter for surprise that a fish which gives such good sport with the fly, and is not difficult to capture with many other lures, is not found in more of our British and Irish rivers, especially when it is remembered that it is an excellent table fish.

Whether the grayling has existed in this country for as many thousands of years as the trout is one of those open questions which must remain open—possibly at some remote future period of our existence we may be enlightened on this point as on many others. There is no harm in supposing that the fish was introduced by monkish fish-lovers from continental rivers; but the sole reason for the supposition is that it is found in so many rivers on which the ruins of monasteries are also found. On the other hand, if the grayling existed here when Great Britain formed part of the mainland of Europe, it is curious, to say the least, that it is not found in Ireland, and has only within the last half century been introduced into Scotland, where it is now plentiful in the Clyde. I have also seen it in the Tweed and Teviot, where it has increased much of late years. Unfortunately this delicate fish is readily attacked and infected by the salmon disease, *Saprolegnia ferax*, that curious fungus or mould which you notice sometimes on a fly which has died sticking to a window pane. Huxley showed that the spores of this mould, if introduced into water, would attack fish and kill them. I have often intended to try the effect of permanganate of potash in the water of an aquarium in which the fish have been attacked by fungus. Some years ago I gave, in the *Fishing Gazette*, an account of most interesting results obtained in Germany by treating a pond of some acres in size with permanganate, and entirely arresting a great mortality among the fish, caused by contamination of the water.

The finest grayling in this country are found in chalk streams, which contain a plentiful supply of that exceedingly useful little creature the fresh-water shrimp, which is very prolific and most nourishing food. As the fresh-water shrimp can be very easily transported alive, I think that if its great value was better known it would be much more freely used for stocking waters with fish food than is the case; it is manifestly hopeless to expect trout or grayling to increase and multiply unless there is plenty of food, and yet many people appear to think they have stocked a water when they have put fish into it. In Shropshire and Herefordshire, in Derbyshire and Yorkshire, where the grayling is found in many of the rivers, the average size is considerably less than in the Itchen and Test in Hampshire, where fish of two pounds and over are as common as pounders elsewhere. An exception is that of the little river Costa, near Pickering, in Yorkshire, which has much of the nature of a south-country chalk stream, and a grand supply of fresh-water shrimp. Here I have seen many grayling between two and four pounds in weight; but I regret to hear that since other lures besides the artificial fly have been allowed the fish have sadly deteriorated both in size and number.

It will be useful to any one who has not had experience of grayling fishing to remember that the fish, although in many respects so different from the trout and salmon, has the adipose fin, the distinguishing mark of the salmon family. As this fin is not used by the fish, and is apparently but a useless little lump of fat, it is supposed to be a survival from some early stage of the life-history of the fish when this fin was used. But the most remarkable thing in the appearance of the grayling, especially after its third year, is its great back fin, which has got it the name of *Signifer* and *Vexillifer*, meaning the "Standard-bearer" or "Banner-bearer." The Esquimaux of Arctic America call the fish *Hewlock Powak*, denoting the fish with the "Wing-like fin." This large back fin, combined with a large air-bladder, enables the fish to rise or sink in the water, almost, if not quite, vertically, and to do so quickly and, as Walton points out, like a shadow.

When in season, *i.e.* from July or August to January or February, the grayling is a very handsome fish, the general tone being a silvery pearl grey on the sides, with whitish belly and dark head and back, the latter relieved by the grand violet fin shot with purple-red. The lines and rows of dark spots, which are also found along the upper half of the body, vary considerably in colour and marking in different rivers and at different seasons and ages. Probably the fact that the general colouring of the grayling differs so much, accounts for the fact that coloured representations of the fish vary so considerably. I caught several in the Chess, below Chesham, last month (September 1902), which were extremely dark along the back, in fact almost black, but in excellent condition and perfect shape. Since then my father sent me one of 1 lb. 3 ozs., caught by Mr. Russell Barton in the Dove in Dovedale, which was of a beautiful golden yellow tint, with a rosy opalescence, especially on the gill-covers, reminding one of the inside of a freshly opened oyster shell. Every scale was like mother-of-pearl touched with gold. The beautifully shaped large back fin was almost transparent near the back, with purple splashes and spots and a line of lake tint along the top; it measured five inches in length and two in depth. The adipose fin was like the ventral, almost colourless, like ground glass, and unusually large; in fact, larger than that of a fine 3½ lb. grayling which I killed in the Test. The deeply forked tail was like opal glass near the root, becoming almost black at the end of each lobe or wing. The belly and throat fins were a beautiful light orange colour. At irregular intervals all along the straight lines of scales were dark spots. The blue-black pupil of the grayling's eye is not round, but pear-shape, with the point towards the nose; the eyeball moves freely in its socket, so that the fish can turn it at an angle to look up or down or sideways. As a rule, the general shape of the grayling is like an unevenly bent bow; the outline from the nose rising steeply to the commencement of the back fin, then sloping gradually to the tail, then from the tail in a comparatively straight line along the belly to the pectoral fins. In the Dove specimen I have endeavoured to describe its contour was much more even and trout-like. The fish had still a faint odour as of thyme, a characteristic I have noticed much more decidedly in some grayling than in others, especially in Test and Itchen fish.

If American observers are correct, the grayling of that country is even more beautifully coloured than our fish, and the dorsal fin larger. The naked-bellied grayling (*Th. Gymnogaster*) is said to be found only in the Neva, and differs from *Th. vulgaris* in having no scales on the belly, a more stumpy head, much smaller scales, and a lower dorsal fin, with only seventeen rays as against twenty-one to twenty-three; its colour is silver grey with bluish back.

The small mouth of the grayling is in striking contrast with that of most of the other members of the Salmonidæ, resembling much more that of the carp family; it is provided with teeth on all the bones of the mouth except the tongue, but they are so small and fine as easily to escape notice unless looked for.

Another characteristic of the grayling, which distinguishes it from the trout, is the smallness of its eggs, and the fact that it spawns in April and May; the eggs, about the size of millet seed, also hatch out much more quickly, three to four weeks being the average time as compared with ten to twelve weeks for trout. The fact that the eggs hatch out so soon makes it impossible at present to send them such great distances as can be easily done in the case of salmon and trout eggs. I say at present, because fish culture cannot be said to have reached the limit of its possibilities. I see no insuperable difficulties in sending grayling eggs to the Cape, and once the fish was established there, it could perhaps be passed on to Australasia.

Grayling take longer to arrive at maturity than trout, not spawning until the third or fourth year, as compared with the second year of the trout. Spawning takes place from April to May, according to the nature of the season—cold retards the spawning; the hen fish, generally accompanied by but one milter, lays her eggs in trenches scooped out in the gravel and covers them up. A favourite place is in a sharply running stream, from one to two feet in depth, with a nice gravelly bed. The trout angler, on a Yorkshire or other trout and grayling stream, at the end of April or early in May, will often come upon a colony of grayling engaged in spawning operations. The fish then lose much of their natural timidity, and it is extremely interesting to see a long stream or shallow alive with them; as seen in the water at this breeding season they have a peculiar faint blue bloom on them, reminding one of the bloom on a grape. After spawning, they are for a time darker in colour and rough to the touch. Undoubtedly grayling will eat trout eggs if they can get them, and I have often found them in them, and doubtless trout will eat the small pearly yellow or orange grayling eggs when they get the chance, especially small trout. The fry has a small umbilical sac, on which it exists for about two or three weeks. They are rather more difficult to rear than trout, probably because there has been so much less done in this way with the grayling; and German fish breeders say that the best results are obtained when their native river water is used, and they are fed on dried mayflies.

The late Mr. Thomas Andrews succeeded in crossing female grayling with trout, but the eggs did not hatch, and Dr. Day gives an account of successful crossing with the milt of salmon trout, in the School of Pisciculture of the French Société d'Acclimatisation. By the way, Dr. Day makes a statement on page 282 of his most valuable work, "Salmonidæ of Britain," which, I think, must be a slip; he says that "about the end of July or commencement of August the fry are about *four or five* inches long." This surely would be impossible for fish hatched at the end of April. He quotes Sir H. Davy as saying that grayling hatched in May or June become nine or ten inches in length by September, and weigh from a quarter to half a pound. I doubt this very much indeed. In 1857 the West of Scotland Angling Club obtained 10,000 grayling ova from the Derwent near Bakewell. The spawn was taken on 13th April 1857, and sent off the same night in common wine bottles half filled with water to Abington, on the Clyde, about fifty miles above Glasgow, where the Club had prepared a rill for its reception. The ova were about an eighth of an inch in diameter, and some samples were retained by Mr. Eyre, who took them for the Club from the Wye grayling, and observed them daily with the microscope. The following extracts from his diary give the most interesting and detailed account of the development of the grayling egg which we have, although it is nearly half a century since the observations were made:—

4th day.—The eggs seem a little larger, and consist of an outer vesicle of elastic membrane, filled with a semi-transparent fluid, and of an inner vesicle or yolk filled with a yellow granular substance, and on the inner vesicle is a spot indicating the germ of the future fish.

6th day.—The form is slightly altered. The fluid appears flocculent.

8th day.—The live fœtus is visible. It is semi-transparent yellow-amber colour; the head in three lobes. The fish lashes its tail violently at regular intervals, eight or ten times a minute. The granules partially absorbed.

10th day.—Temperature of the room, 53°. River (Derwent) 52°. Fœtus less active.

30th day.—The fœtus made its first partial detachment from the enveloping membrane by freeing its tail. About half-an-hour afterwards it entirely and suddenly disconnected itself from the chorion, which sank to the bottom of the glass. Temperature 60°. The eyes well developed, the mouth seems still closed. The umbilical sac filled with granular matter attached to the thorax. Pulsation regular. Above the place of the hinder part of the gill-cover a constant and rapid motion is apparent, above 160 per minute. This may be from the vibrating edge of the fine membrane, which at present forms a substitute for the true gills, or it may be from the rapid circulation of the blood in loops coming to the water to be aerated, or it may be from cilia on the edge of the membrane. The membrane, or whatever looks like it, is so transparent that it is difficult to decide. The markings of the vertebræ are apparent. The place of the vent is indicated by a scarlet spot.

33rd day.—The mouth is now in constant but slow motion; the yolk-sac much lessened in size.

41st day.—The young fish are now perfect, and are about nine-tenths of an inch in length, and the umbilical sac is absorbed.

These ova were duly examined by being placed under the microscope or other magnifier, and part continually destroyed, probably from the concentrated light of the lenses. On one occasion Mr. Eyre and Mr. Peach were examining a rather forward-looking ovum under the microscope, when the fish, by an instantaneous effort, burst the membrane or chorion, and in a few minutes after they saw him, by another effort, free himself entirely from it. This was a wonderful piece of good fortune, as this particular operation might have been watched for for years fruitlessly.

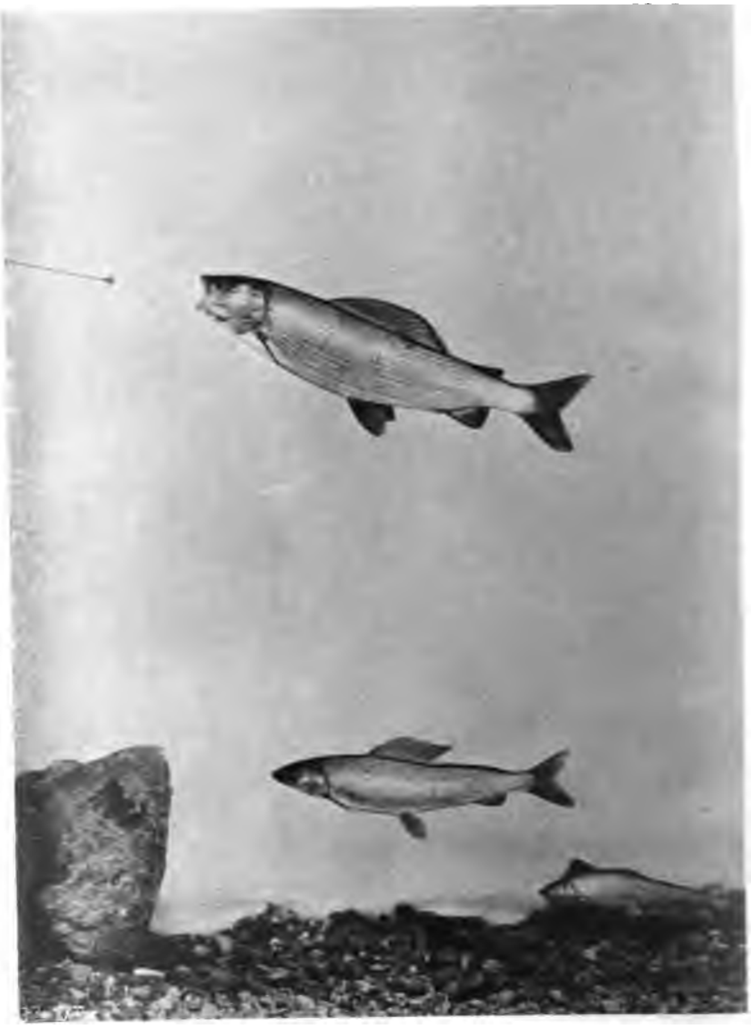
In the *natural rill* falling into the Clyde, the first fish appeared on the *seventeenth day*, and the average was twenty days. In some ova placed in boxes through which the same rill ran, the average time was *forty* days.

In June 1857, these young grayling were about the size of minnows, healthy, and in the evening rose freely at small flies. I estimated their number at 3000 or 4000.

In March 1858, they were on the average five inches in length (some reached 6½), and were doing well.

It is a matter of history that this very simple method of transporting grayling ova stocked the Clyde with the fish. It seems to me to prove, as I have already remarked, that it would be possible to send grayling ova even to the antipodes, also that Dr. Day and Sir H. Davy were mistaken if they supposed that grayling hatched in May or June can reach a weight of from ¼ lb. to ½ lb. by September! The fish sent to the Clyde were only about five

126.—"HERE AND THERE A GRAYLING."



127.—GRAYLING.

inches in length in March 1858, or quite ten months after they were hatched.

From a paper read before the American Fisheries Society in 1900, my friend, Dr. James A. Henshall, who is in charge of the Government Fish-Breeding Establishment at Bozeman, Montana, I give the following account of the doctor's experiences in grayling culture and his most interesting discovery of the peculiar formation of the mouth of the very young grayling fry, which prevents its taking the ordinary food on which trout fry are reared. He says:—

> The successful culture of the Montana grayling and the safe transportation of grayling eggs, under proper conditions, are no longer matters of experiment. My first attempt, two years ago, to hatch and rear the grayling on the same lines as those usually pursued with trout was almost a total failure owing to a lack of suitable conditions and a want of experimental knowledge concerning the character of the eggs and habits of the fry.
>
> The published accounts of the experiments of Seth Green and Fred Mather with the Michigan grayling in 1874 were both meagre and unsatisfactory, and availed nothing; nor was I able, consequently, to obtain any additional or definite information on the subject from Mr. Mather, who seemed to have forgotten all the details connected with his experiment.
>
> Both Green and Mather pursued the same method in hatching and feeding the grayling as with brook trout, which leads me to doubt that either of them succeeded in rearing the fry.
>
> In the first place, grayling fry cannot be reared in the hatchery in cold spring water, owing to its low temperature

and the entire absence of natural food, for neither air nor food exists in spring water as it issues from the ground.

Neither can the fry be induced to take the artificial food generally used for trout fry to any great extent in the hatching troughs.

In my first experiments I was much chagrined and discouraged at seeing the diminutive organisms curl up and drop dead to the bottom of the trough, notwithstanding a great variety of substances had been offered to induce them to feed.

At this time I was impressed with the apparent resemblance of the grayling fry to the lake whitefish fry, both in size and appearance, which led me to think that they also required similar food. Upon examining the fry under the microscope I discovered that my surmise was correct, inasmuch as the grayling fry had two fang-like retrorse teeth in the upper jaw similar to those in the lake whitefish fry. This fact at once solved the problem. It was imperative that they be supplied with such natural food as is found only in the water of streams and lakes.

Acting upon this hint, I turned all the remaining fry into a sheltered, shallow bight of the creek that flows through the hatchery ground. There they did well for several weeks, when they sought other portions of the stream.

In the following autumn I constructed a large pond, and supplied it with creek water by a ditch 1500 feet in length. From this pond I supplied the nursery ponds with creek water. By holding a glassful of this water to the light, hundreds of small crustaceans (*Entomostraca*) could be observed, appearing to the naked eye like specks of dust, and this was just what the grayling fry needed, as my subsequent experience proved.

Another desideratum to be considered for grayling, is the warmer temperature of creek water as compared with spring water. They also need sunshine. While trout fry usually seek the shady side of the ponds, the grayling fry prefer the sunny side.

My method is now to transfer the fry as soon as they begin to swim on the surface of the water in the hatching troughs, and before their yolk sacs are entirely absorbed, to the nursery ponds. They take kindly to the change, and at once begin foraging for their natural food of crustaceans, insect larvæ, &c. They are extremely active for such small organisms, and pursue their minute prey unceasingly. Soon thereafter they can be taught to take liver emulsion, and still later they begin to eat each other, for they are as much addicted to cannibalism as the pike-perch fry. The only remedy for this proclivity is to provide twice as many fry as it is desired to rear, and, as soon as practicable, to separate the larger from the smaller ones.

In stocking streams with grayling fry it is my opinion that they should be planted within a few weeks after they are transferred to the rearing ponds, or even as soon as they begin to swim freely, as is done with lake whitefish fry, provided that suitable places be selected in the stream. Shallow, weedy situations in the eddies or back water of the smallest tributaries should be chosen. There they would find their requisite food, and be safe from the depredations of larger fishes.

A very important matter to be considered when the fry are placed in the rearing pond is to see that there is no leakage in the drain boxes, and that the screens are caulked in their grooves, and the screens themselves reinforced by perforated tin of the smallest calibre, otherwise many fry will escape. I have lost thousands from leaky outlet boxes, when apparently they were perfectly tight. But, as grayling fry will worm themselves, at first, through a pinhole, it is evident that the utmost precaution must be observed to prevent their escape.

To what weight do grayling grow? This has always been an interesting question to me, and I have no doubt to all grayling anglers. Some writers, including Dr. Francis Day, mention that "it is said" to reach a weight of eight or nine pounds in Lapland. But in the face of the following information, which I have recently obtained from three anglers, who have all fished for and caught many grayling in Lapland, I must say I no longer entertain the hope cherished for many years of at some time or other catching a monster grayling in Lapland. The first angler I asked was my friend Mr. E. B. Kennedy, who has visited Lapland many times, and caught thousands of grayling there, but he never killed or saw a grayling over 3 lbs. 4 ozs.; he caught a fish that weight with a natural stonefly.

A friend of his who has fished within the Arctic Circle (Admiral B.) says: "I got plenty of grayling in Lapland up to 3 lbs." The Earl of Mayo says: "With reference to your inquiry about the size of grayling in Sweden, I have, for several years, made careful inquiries from all classes of Swedes acquainted with fishing, and they say they never get with their nets, or with rod and line, grayling larger than 3 or 3½ lbs. I have taken grayling there up to 2½ lbs., English weight, and I think I got one once of 3 lbs., but I have not my old journals here. I consider grayling are more surface and natural feeders in those northern waters (within the Arctic Circle) than people imagine."

Mr. Kennedy also says of these Lapland grayling, that they "specially take the fly well."

In this country there are several records of grayling over 4 lbs. Dr. Day says that in the spring of 1887, one 5¼ lbs. was caught in a weir trap, at the top of the Camlet in Shropshire. Jesse says, in his "Angler's Rambles," that in 1835 a member of the Houghton Fishing Club sent him a grayling, which weighed 4½ lbs.; and a few years ago, Mr. Bryant, fishing near Bambridge on the Itchen, killed a grayling of 4¼ lbs. I have killed many fine grayling in the Test and Itchen, but none over 3½ lbs. I have also had capital sport in most of our other grayling rivers, but in the Midlands, west and north of England, they do not as a rule run so large as in the south; and a fish of a pound or a pound and a half is considered a good one.

Fly-Fishing for Grayling

Undoubtedly the best way of fishing for grayling is with the artificial fly, though it may not be the most killing way, especially for large fish. The rod and tackle and flies are practically the same as one would use for trout in the same water; and as the best fly to use for trout is an imitation of the natural fly they may be taking, so it is for grayling, and although I always carry with me and very often use "fancy" grayling flies, I prefer a copy of a natural fly if they are taking one. I do not think it is necessary to give a description of the standard grayling flies found in every book on fly-fishing of the "fancy" patterns; I have had best sport with the Red Tag, Honeydun Bumble, Mulberry Bumble, and Wickham's Fancy. On the Itchen, for big grayling, a pink Wickham is often irresistible, fished up-stream, and of course dry; in spite of the *dictum* of a writer in the *Field*, that to fish up-stream with a dry fly for grayling is "a mistake," it is often the only way to make the fish make a mistake.

I know few things in fishing more enjoyable than, on a bright autumn day, to have before you a long stretch of the Itchen or Test, or some other good grayling stream, in your hand a light 10-foot fly-rod, which will put a fly-line out lightly for twenty yards or so, and to see wave rings of various sizes breaking the surface of pool and stream every now and then with a fair sprinkling of fly coming down. It is impossible to be certain of hooking it, but you feel quite certain of rising the good fish, feeding steadily a yard from the opposite bank, and having noticed that the fly on is a large dark olive, you put that most killing of flies on to your cast, oil it with a touch of the invaluable paraffin, wash it by a few casts in the water close to you, until it floats well, and then, pulling out line as you make casts in the air, you drop it on the water so that it will float over the grayling exactly as the natural fly does. As the fly floats on, you point the rod straight at it as if it were a gun, and with the left hand draw in any slack if necessary, and if the fish rises, the rod is moved instantly. The question is, what is the best way to move it so that the "pull" will fix the hook. I think the best way is not to lift the rod point up vertically into the air towards a point over your head, but sideways horizontally, over the water to right or left, according to which side you are fishing from. I know the great majority of anglers strike upwards, and I very often do so myself, from having always done so before I found that I hooked more fish the other way. On one occasion a good many years ago, when fishing in the Itchen on one of the deep bits of streamy water below Horsebridge, I was casting straight up to fish rising on my side close in, and repeatedly missed my fish—it was only a short cast. After muffing several in this way and feeling badly that I wanted to kick myself, as dear old Ruben Wood used to say, I tried holding my rod well down, and moving the point gently round and down stream as the fly came down, and directly the fish rose, quickening the movement in the same direction, and instead of missing nearly every rise, I hooked the fish.

I think if I had to select one fly only to use for trout and grayling, it would be the olive, in different sizes, of course, with body varying from light amber to claret. Although I have never seen a river where the dry fly was "no use" in some places and on some occasions, still there is no doubt that on many of our northern grayling streams the three-fly cast fished in the "wet-fly" style is still the most killing way. I say "still," because it is only within the last quarter of a century that dry-fly fishing has been the rule in Hampshire; now to fish there with the wet fly is sheer waste of time as a rule. I have often heard a north-country angler say "the dry fly is all right on your slow south-country streams, but it is no use here in rough water and stickles, why, it would be drowned at once." But this is quite a mistake—provided there is no drag on the fly, and it is oiled, it will float on the roughest water on the wettest day; and if the fish are taking fly on the surface, it will kill as well as in the south, and in addition to this there are miles of north-country streams, which the wet-fly man passes by, still pools, and slow stretches of stream, where the dry fly is often most deadly.

I had some capital sport on the Upper Floors Water on the Tweed in May 1901, fishing for trout with the wet fly and dry fly at the same time. I used three flies, the end fly dry (oiled), the next wet (not oiled), and the top dropper dry (oiled), or perhaps two of the flies wet and one dry; and it was very interesting to see the two little Greenwells floating down on the broken water like the natural flies, and a black head quietly suck one in, or to see the flash of light on the side of a trout as he turned after taking the fly just under the surface. Of course, in this fishing you must fish up-stream, or up and across. But I always did prefer this plan, long before I used the dry fly, except for grayling; and in fishing for grayling with the wet fly it is often the best plan to cast across and down, and let the flies come round, as in salmon fly-fishing; and this often answers on the deep slow parts of grayling streams, and in bright weather, provided you let the flies sink a foot or so, and use small flies and very light fine tackle. In fishing north-country grayling streams, especially those of Yorkshire, I have always provided myself with some of the local patterns, dressed spider fashion—skinny bodies, no hackle on the body, and the wings dressed hackle fashion, which always remind me of an open umbrella with no covering, only ribs and stick; and I have at times done well with them, but as a rule I found something or other in the old stock in my fly-book equal to the occasion, not perhaps because they are better than the local patterns, but because the fish are not so used to seeing and feeling them.

As regards the quality of the grayling as a fighting fish, it certainly varies far more in this respect than the trout, and, as a rule, is less difficult to bring to the net; but I have had many a fight with Test and Itchen grayling, which could not be surpassed, and sometimes not equalled by a trout. On the Test at Houghton and Horsebridge I have had fish which seemed as if they would never give in, even leaping out of the water at times, which a grayling is not supposed to do. The longer a Test or Itchen grayling is on before you get him in the larger he is likely to be; he often gives in before he realises what is up, but if he does realise it, he gains new strength and fights harder than at first. As to a grayling's mouth being tender it is all nonsense, unless he is too small to keep. Young grayling are tender in the mouth, far more so than trout.

BAIT-FISHING FOR GRAYLING

Fly-fishing is, of course, the highest style of fishing for grayling or any other fish which will take a fly, but on rivers where it is allowed excellent sport can be had by using bait of different kinds in different ways. In the winter the most deadly way is what is called in Yorkshire "swimming the worm." It is simple enough—a lively red worm on a small hook with a small float on a couple of yards of fine gut and a shot or two. The fly rod can be used, the bait is thrown out with a swing of the rod and allowed to float down the stream so that the worm is suspended and "swims" for six inches to a foot from the bottom. Grayling will feed briskly in frosty weather, and can rarely resist the lively red worm as it comes dangling over their heads. The float is merely a little oval cork with a hole through it, the line is passed through it and then plugged with a bit of quill with a little red sealing-wax on the top, to help you to see it as it swims down among the bubbles and froth from the weir or the waves on a windy day. Suddenly it is drawn straight down, which shows that a grayling has risen to meet the bait, taken it, and returned to its place; a gentle turn of the wrist as the float goes down sends the hook into the gristle-like lip, and if you are trying for the first time, you will be astonished at the excellent sport the fish gives, for, like the chub, the grayling revels in ice-cold water, and is then in best condition.

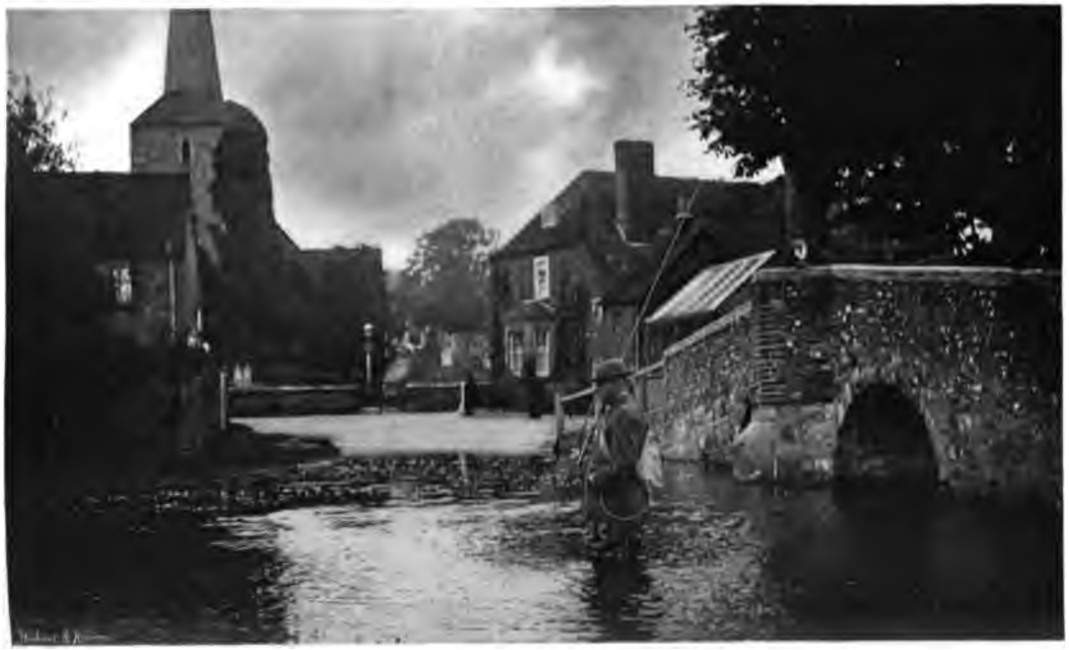
In the Midlands ledgering with a light float is a favourite method. You first bait a swim or hole with gentles, wasp grub, ant eggs, caddis, or other bait; then having fixed your light float—(a quarter-inch section off the top of a medicine cork with the chemist's red sealing-wax on it answers admirably, with a bit of quill as plug)—having fixed the float so that the shots rest on the bottom of the river, allowing the bait to rest on it, you swing it out across and down stream, so that the stream will carry the bait down, then you draw the rod point a little up stream and hold it so that the float is held against the current, which will move it about gently an inch or so. There can be no mistaking a bite; the float gives little bobs and then goes under. This is the time to strike, and if you use an old fly rod, and the fish is a ¾ lb. or larger grayling you will have good sport, as it is hooked, as a rule, in the mouth. Good trout and other fish, of course, are often taken in this way. In using wasp grub for bait I find the yellow semi-formed grub best for grayling, one with head and legs partly formed; for trout I prefer the young grub which is found in the two outer rows of the comb, which looks like a little yellow sack of flour. I have killed lovely trout with it, fishing under an alder stub and letting the float glide gently underneath and then holding it still.

GRASSHOPPER-FISHING FOR GRAYLING

Although I have tried it in Yorkshire and Derbyshire, I have never done much with what is called grasshopper-fishing, except in the grayling streams of Shropshire, Herefordshire, and the Welsh border district. I should imagine that to be the original home of this deadly method of taking grayling—so deadly in the hands of an adept that it is forbidden on many waters, and restricted to a very few days in the season on others. I think the first published description of it will be found in Charles Bowlker's very practical treatise on the "Art of Angling," published more than a hundred years ago, and the best illustrated description in that rather rare little work "The Rod and Line," by Hewett Wheatley (1849). Wheatley was about fifty years before his time. I have never seen better eyed hooks than those he had made for dressing his flies on—his coloured plates of the leaded grasshopper bait are excellent, as are all his illustrations.

The best hook for the artificial grasshopper is a Limerick about an inch in length, the shank is leaded with a pear-shaped lead, the thick part uppermost. This is covered with green worsted, wound on; on two sides of the bait a strip of bright straw is whipped on, which makes it look like bright yellow stripes on bright green peg-top trousers,

128.—CAUGHT UP.



129 THE VILLAGE POOL.

All kinds of bait can be used on the point of the hook, a real grasshopper, gentles, caddis-bait, a bluebottle fly—in fact, anything which grayling and trout feed on. The hook is leaded in order that it may quickly sink. The float can be made of a bit of crow's quill an inch long. The line is passed through it, and then plugged with a bit of stem of any white feather; it is intended merely as a mark for the eye. The rod should be a light whole cane, fairly stiff, so that the leaded bait can be swung out easily and dropped gently into any place you want to fish. The line should be a fine plaited silk, the last few yards stained some dark tint—to match the fine gut line of two or three yards stained a smoky blue colour. In this style of fishing you search the bed of the river in every direction, and then move on to another spot. The baited hook is swung out gently and allowed to sink, then lift the bait from six to twelve inches and sink it again. Wheatley recommends giving very slight jerks with the wrist, but a steady sink and draw action is better; the rod top is moved a little now and then, so that you gradually cover all the water within reach. Now the object of the little white float is to tell you when a fish has taken the bait. If you see that instead of sinking straight it moves to one side, strike gently, if you see it stop before the bait has touched the bottom strike gently, for this generally means that a grayling has risen to meet it as it descends. As Bowlker points out, you can insinuate this bait into all the most likely "holts" for fish, behind stubs, down by an old stump, into eddies—in fact, anywhere and everywhere. If you can use the Nottingham reel, you can fish by casting out into a wide stream and winding in between each sink and draw. It is a very interesting style of fishing, and will capture all kinds of fish, as the tempting bait is put right under their noses, and the motion adds greatly to the attraction.

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